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Terrestrial Isopoda from Guatemala and Mexico (Crustacea: Oniscidea: Crinocheta)

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Terrestrial Isopoda from Guatemala and Mexico (Crustacea: Oniscidea: Crinocheta). - Some terrestrial Isopoda from Mexico, described in the genus *Philoscia* Latreille, 1804, are redescribed and transferred to other genera. Two new genera, *Quintanoscia* gen. n. and *Oxalaniscus* gen. n. are described, they belong to the most primitive representatives of the Oniscoidea within the Crinocheta. One of the species, *Androdeloscia formosa* (Mulaik, 1960) is recorded from Guatemala for the first time. A closely related species, *A. valdezi* sp. n. is described as new to science. New records for *Littorophiloscia denticulata* (Ferrara & Taiti, 1981) and *Burmoniscus kohleri* (Schmalfuss & Ferrara, 1978) are presented; they were recorded in the New World for the first time. Their distributional patterns and phylogenetic relationships are discussed.

Key-words: Crustacea - Oniscidea - *Philoscia* - *Androdeloscia* - *Littorophiloscia* - *Burmoniscus* - new genera - new species - Central America - taxonomy.

INTRODUCTION

Central America is one of the regions of the world, which is almost unexplored with respect to the terrestrial isopod fauna. Only few contributions deal with taxa of Oniscoidea collected in this biogeographically interesting area, as e.g., Miers (1877) reporting on some Oniscidea from Central America. Particularly isopods of the northern countries, Mexico and Guatemala, are little known. Richardson (1907) described a new scleropactid species *Spherarmadillo schwarzi* Richardson, 1907, from Guatemala and later a species of Armadillidae, *Globarmadillo armatus* Richard-

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son, 1910 was described by Richardson (1910). This work remains the only contribution to the Guatemalan oniscidean fauna.

The exhaustive contribution of Mulaik (1960) on the terrestrial isopod fauna of Mexico is an important work, although the taxonomy used was no more up to date in 1960. Many species placed in the genus *Philoscia* Latreille, 1960 do not show any apomorphic character in common with, e.g., the European *Philoscia muscorum* (Scopoli, 1793), which is a typical member of this genus. Some of the species included in *Philoscia* are among the most primitive representatives of Oniscoidea as defined by Schmalfuss (1989): they, for instance, lack the noduli laterales. Some species of *Philoscia* were revised in this study and transferred to other genera.

More recently, Schultz (1977) contributed to our knowledge of the troglobitic species of Oniscidea from Central America, with *Troglophiloscia laevis* Schultz, 1977 being added to the Mexican fauna. The species is related to the Cuban *T. silvestrii* Brian, 1929, the type of the genus (Brian, 1929). The species might also occur in northern Guatemala, as there are many caves in the northern province Petén, which might be suitable habitats for this genus. However, it was not found in the Cueva Actún Can near Santa Elena, Petén in a recently started survey.

This study aims to increase our knowlegde on the crinochete Oniscidea , which are of philosciid appearance. Several species are described in detail to get access to a complete data set for a phylogenetic analysis. New data are given for some species probably introduced to Guatemala. Both *Littorophiloscia denticulata* (Ferrara & Taiti, 1981) and *Burmoniscus kohleri* (Schmalfuss & Ferrara, 1978) are recorded for the first time from the New World. Ther distribtional patterns and phylogenetic relationships are discussed.

The material examined is deposited in: Instituto Politécnico Nacional de México (IPNM), Staatliches Museum für naturkunde (SMNS), Muséum d'histoire naturelle de Genève (MNHG), Universidad del Valle de Guatemala (UVG) and in the author's collection.

SPECIES ACCOUNT

Quintanoscia gen. n.

Diagnosis: Cephalothorax without linea frontalis and linea supra-antennalis; lamina frontalis present; compound eyes composed of 12 ommatidia; antennula composed of three cylindrical articles; antennal flagellum three-articulate with apical organ bearing two short free sensilla.

Mandibles with molar penicil consisting of three branches; medial endite of maxillula with two penicils and apical tip; lateral endite with 4+6 teeth and slender stalk; lobes of maxilla subrectangular; densely covered with trichiae; maxilliped basipodite without sulcus lateralis; palp three-articulate; proximal article with two long setae; medial and distal article with prominent setal tufts; endite elongate; setose; with long penicil rostrally.

Pereopods stout; antenna-grooming brush of carpus 1 arranged longitudinally; dactylus with long inner claw; dactylar seta ending in a knob; coxal plates without sulcus marginalis and gland pores; noduli laterales present: quite similar to tricorn-like setae; insertion on all coxal plates at same distance from lateral margin.

Pleopods with rhomboidal exopodites bearing sensory spines laterally; endopodites subquadrangular; no respiratory areas discernible at 400x magnification; male genital papilla with ventral shield.

Uropod with protopodite laterally grooved; exopodite twice as long as the more proximally inserted endopodite.

TYPE SPECIES: *Philoscia contoyensis* Mulaik, 1960 (by monotypy).

NUMBER OF NOMINAL SPECIES: only type species.

ETYMOLOGY: The genus is named after the Mexican province Quintana Roo, where the type species was collected.

DISTRIBUTION: Only known from southeastern Mexico on the Yucatán Peninsula.

REMARKS: The genus *Quintanoscia* gen. n. is close to the groundpattern of the Oniscoidea, the shape of the maxilliped is similar to *Deto* Guérin, 1836 and *Alloniscus* Dana, 1852. The pereopod 1 is equipped with a longitudinal carpal brush and the medial margin is bearing several bifid sensory spines. The autapomorphies of the genus are:

- Reduction of the lateral lobes [lateral lobes present]
- *Cephalothorax* broadened [*vertex* not broader than height of *cephalothorax*]

The coxal plates bear several tricorn-like setae. One of those setae bears a distinctly longer sensillum, which is twice as long as the basal cuticular plaque. This structure can be interpreted as a nodulus lateralis.

Quintanoscia contoyensis (Mulaik, 1960) Figs 1-6

Philoscia contoyensis Mulaik, 1960

Material: Paratypes, 5 ♂ (max. body length 3.5 mm): Mexico, Quintana Roo, Isla Contoy, leg. 20.XI.1947, B.F. Osorio Tafall, IPNM 1631-A.

Colour: Mulaik (1960) wrote in the original description: "La coloración de los ejemplares conservados en alcohol; es un moteado de café; rojizo y armadillo. El color más obscuro está confiando a una franja dorsal; media; delgada e irregular; a una area angosta a lo largo de los márgenes de os epimeros y entre estas; a otra banda más angosta fragmentada en manchas. La region ventral es casi blanca. Las formes jovenes muestran menos pigmento que los adultos."

Cephalothorax: Rather large with regard to body length; compound eyes bearing 12 ommatidia; vertex strongly arched; no linea frontalis and linea supra-antennalis visible; lamina frontalis inconspicuous (fig. 1; Ctf).

Pereon: Tegument smooth and shiny; bearing evenly spread tricorn-like setae; noduli laterales similar to tricorn-like setae; sensillum comparatively longer; on all coxal plates insertion at same distance to lateral margin; more distally located from plate I to VII; no sulcus marginalis and gland pores.

Pleon: Rather short; narrower than pereon; prominent neopleurae on pleonites III to IV; pleotelson half as long than pleon; triangular; bordered by tricorn-like setae.

Appendages:

Antennula: Three-articulate with cylindrical articles; distal article bearing longitudinally arranged aesthetascs (fig. 1; An1).

Antenna: Peduncle covered with tricorn-like setae; flagellum three-articulate; medial and distal article with pair of aesthetascs; apical organ as long as medial article; with short free sensilla (fig. 5; An2).

Mouth parts as described in generic diagnosis (fig. 2).

Pereopods: Rather stout; carpus 1 with longitudinal antenna-grooming brush; medial border of carpus and merus 1 to 4 bearing many bifid sensory spines (fig. 3-5; PE1-7); dactylus with medium-sized inner claw (fig. 3; Dac); stout interungual seta; tricorn-like seta laterally; dactylar seta with knob-like tip (fig. 4; Sd5). Sexual dimorphism: Due to the lack of females not observed.

Pleopods: Exopodites rhomboidal with lateral margin bearing four to ten sensory spines; on pleopod 4 and 5 one subapically on medial border; pleopod 5 with small pectinate scales caudally; not arranged in rows; endopodites rounded triangular to quadrangular; respiratory areas not discernible at 400x magnification (fig. 6; PL1-5). Sexual dimorphism: Pleopod 1 endopodite long; rather prominent with ill-defined basal area containing the intrinsic endopodite 1 levering muscle M49 (Erhard, 1997); no row of small spines medio-caudally (fig. 6; PL1); pleopod 2 exopodite with lateral margin slightly more sinuous than on exopodite 3; endopodite twice as long as exopodite; rather stout (fig. 6; PL2).

Uropod: Protopodite triangular with lateral groove; endopodite inserting more proximally than two times longer exopodite (fig. 5; UR).

Genital papilla: Ventral shield with parallel margins in basal half; slightly surpassed by orifices (fig. 6; Gen).

Oxalaniscus gen. n.

Diagnosis: Cephalothorax with lamina frontalis; linea supra-antennalis and lateral lobes; linea frontalis reduced; compound eyes composed of about nine ommatidia. Antennula three-articulate; slender; antenna with three-articulate flagellum (Mulaik, 1960).

Mandible with molar penicil composed of three branches; lateral endite of maxillula with 4+5 simple teeth; slender stalk present; maxilla subrectangular; maxilliped with long penicil on endite and prominent setal tufts on palp.

Pereopods with coxal plates lacking distinct nodulus lateralis; carpus 1 with longitudinal carpal brush; setal brushes composed of sensory spines; not very dense; present on carpus and merus 1 to 5; dactylar seta apically spatuliform.

Pleopods with prominent exopodites bearing few sensory spines laterally; no respiratory structures discernible.

Uropod with protopodite subtriangular carrying lateral groove; endopodite inserting slightly proximally of exopodite. Genital papilla with ventral shield surpassed by terminal spatula.

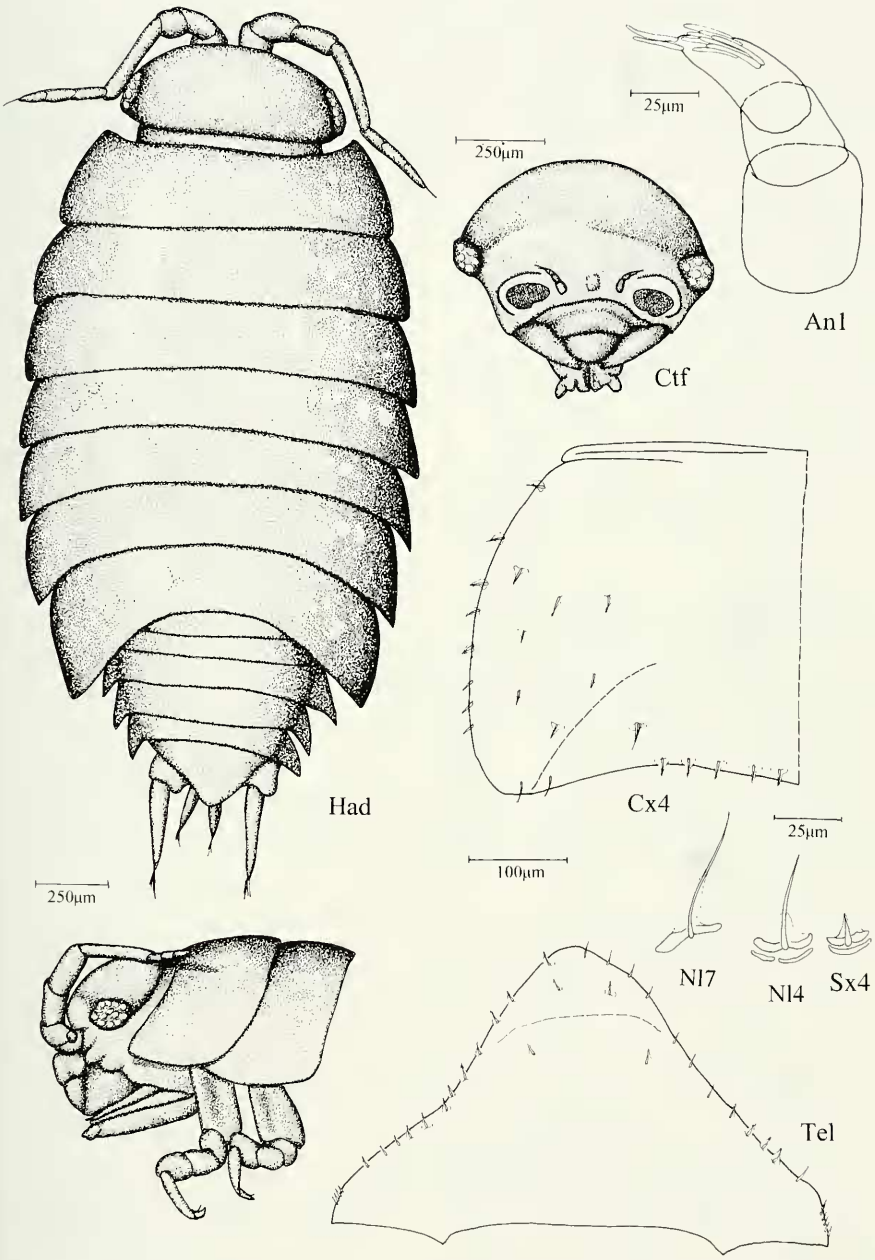

FIG. 1: *Quintanoscia contoyensis* (Mulaik, 1960), ♂ 3.5mm body length. An1 antennula; Ctf cephalothorax in frontal view; Cx4 coxal plate IV; Had habitus in dorsal view; Hal habitus in lateral view; Nl4/7 setae of nodulus lateralis shape from coxal Figures IV and VII; Sx4 tricorn-like seta of coxal plate IV; Tel pleotelson.

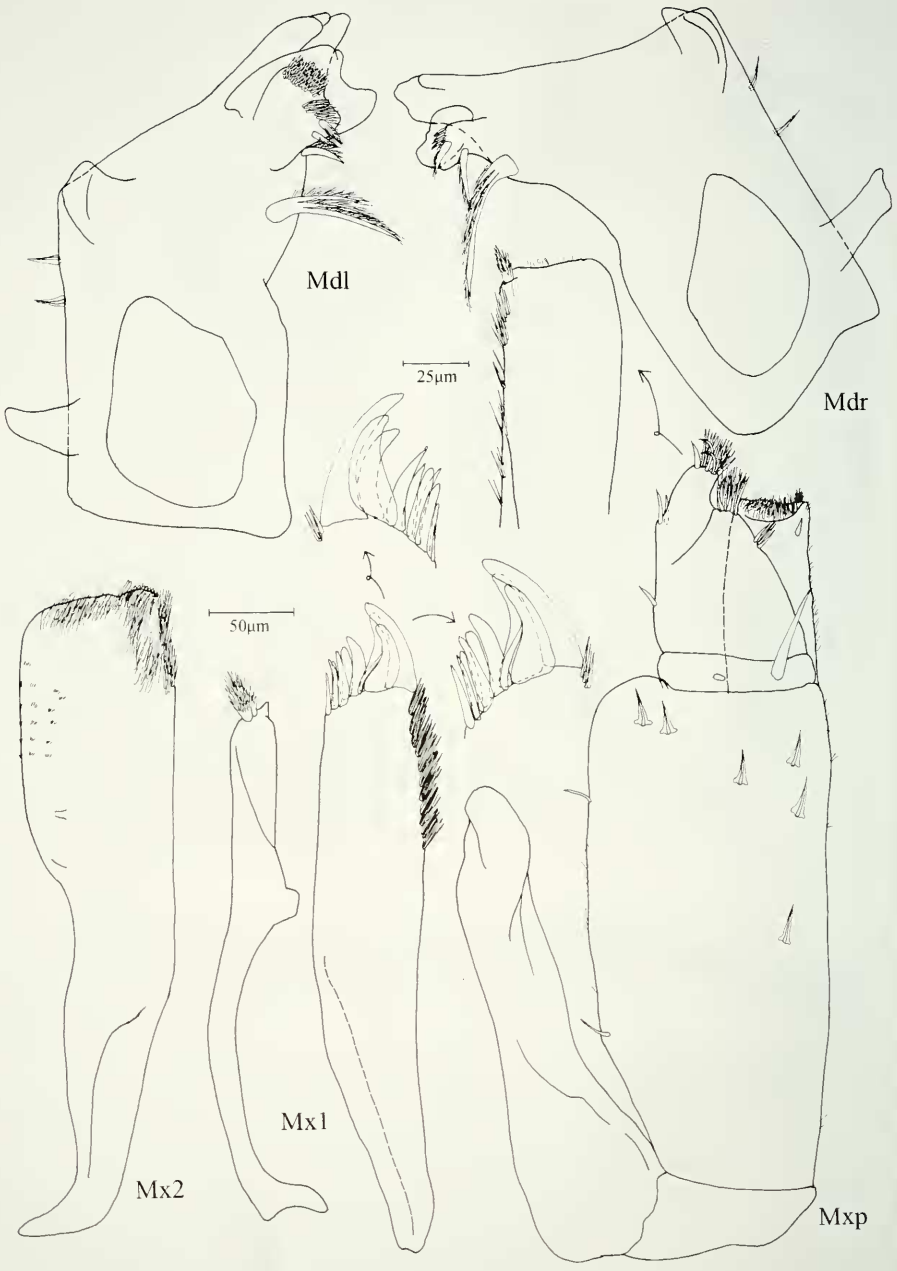

FIG. 2: *Quintanoscia contoyensis* (Mulaik, 1960). ♂ 3.5mm body length. Mdl/r left and right mandible; Mxp maxilliped, with detail of endite in rostral view; Mx1 maxillula, with details of apical lateral endite in caudal and rostral view; Mx2 maxilla.

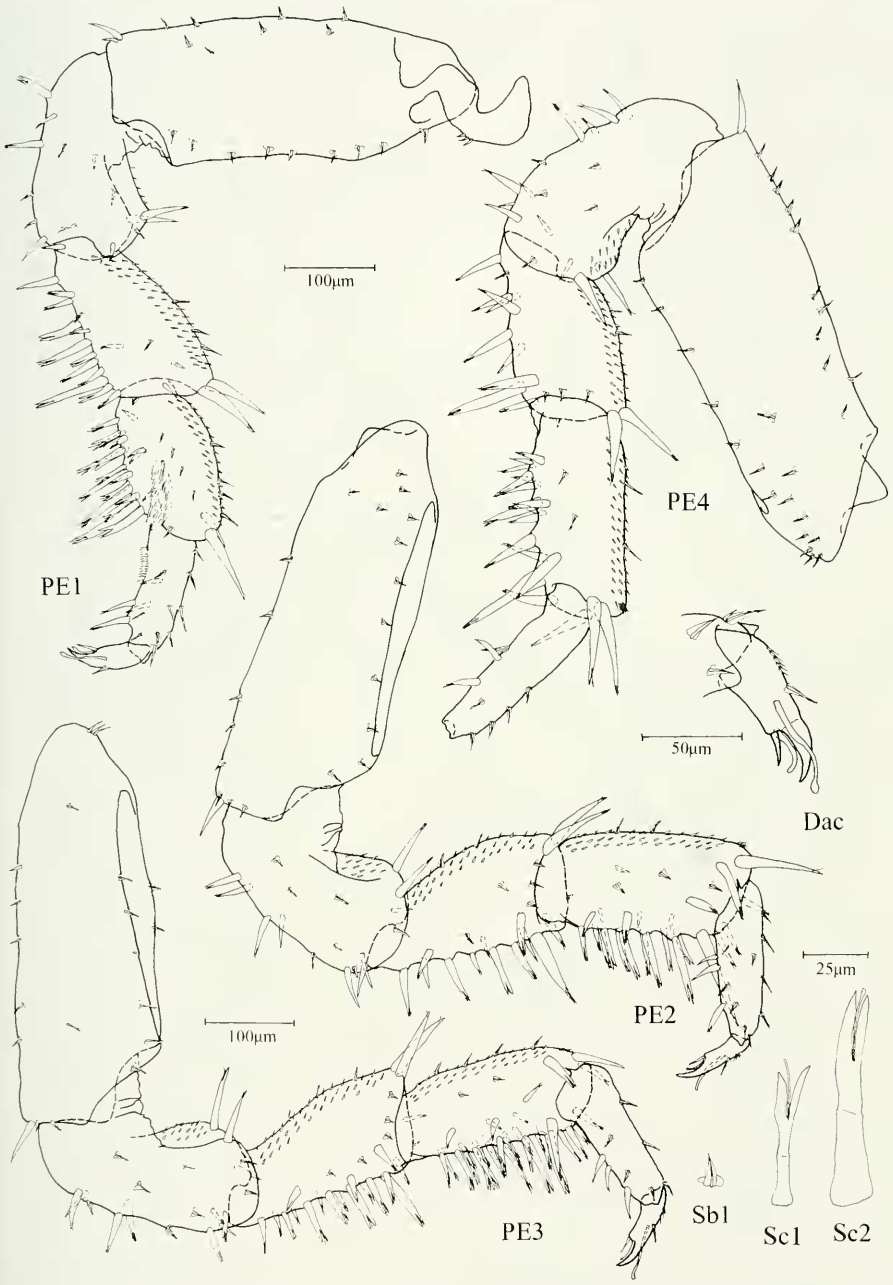

FIG. 3: *Quintanoscia contoyensis* (Mulaik, 1960), ♂ 3.5mm body length. Dac dactylus of pereopod 1 in rostral view; PE1-4 pereopods 1 to 4, in rostral (PE1) or caudal (PE2-4) view; Sb1 tricorn-like seta of basis 1; Sc1 sensory spine of carpal brush; Sc2 sensory spine of carpus 2.

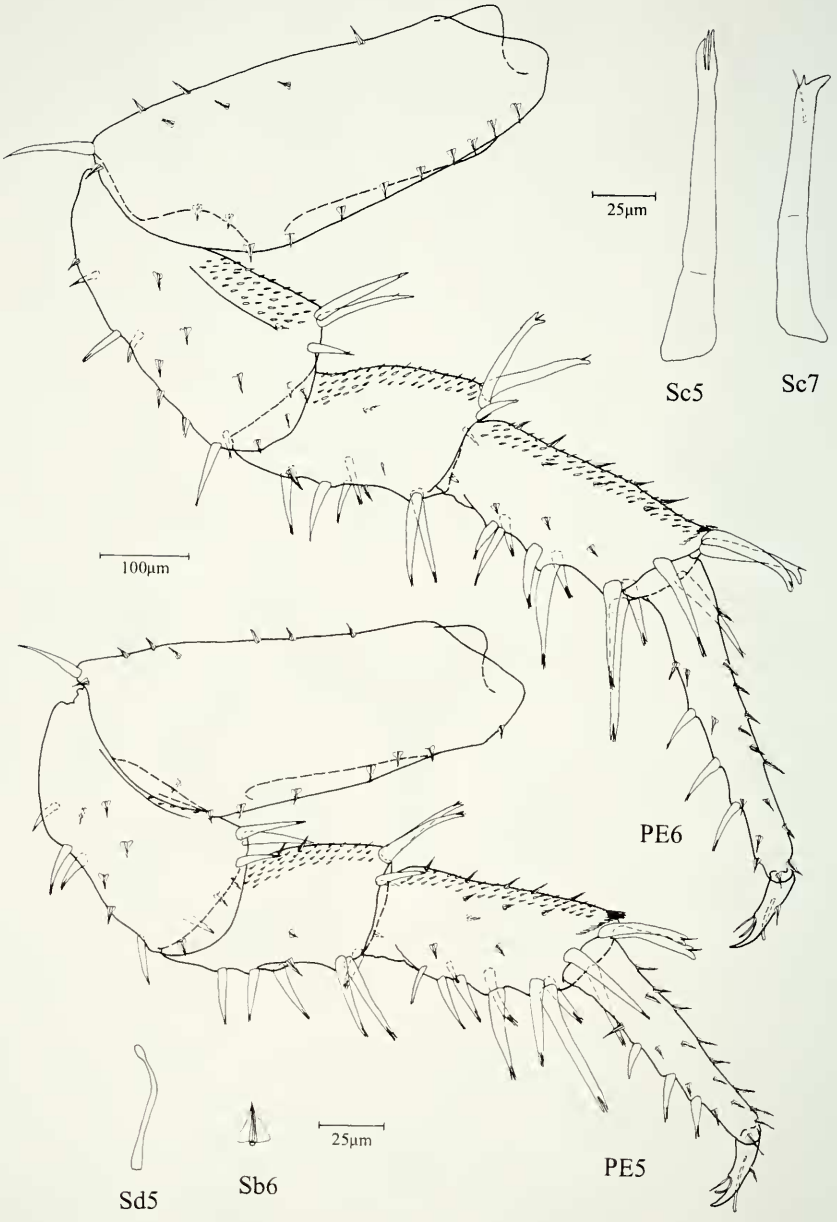

FIG. 4: *Quintanoscia contoyensis* (Mulaik, 1960). ♂ 3.5mm body length. PE5-6 pereopods 5 and 6 in caudal view; Sb6 tricorn-like seta of basis 6; Sc5/7 sensory spines of carpus 5 and 7; Sd5 dactylar seta of dactylus 5.

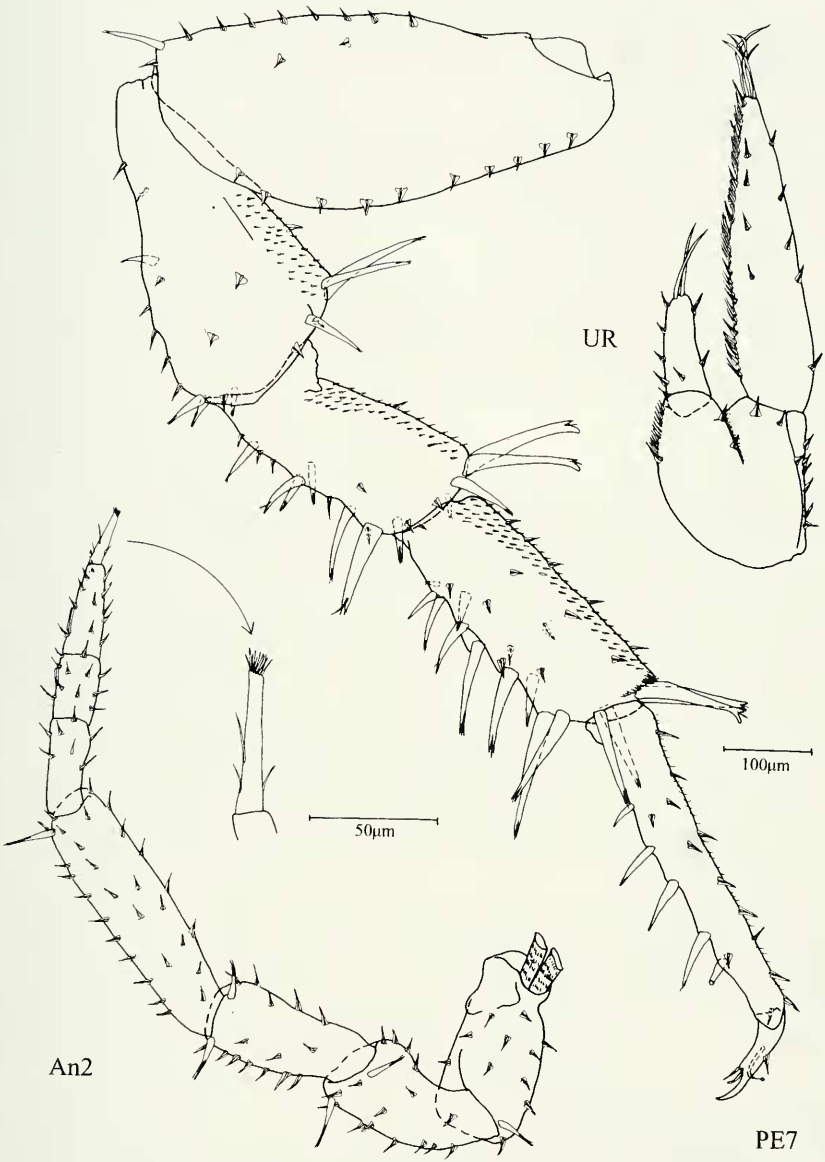

FIG. 5: *Quintanoscia contoyensis* (Mulaik, 1960), ♂ 3.5mm body length. An2 antenna, with detail of apical organ; PE7 pereopod 7 in caudal view; UR uropod in rostral view.

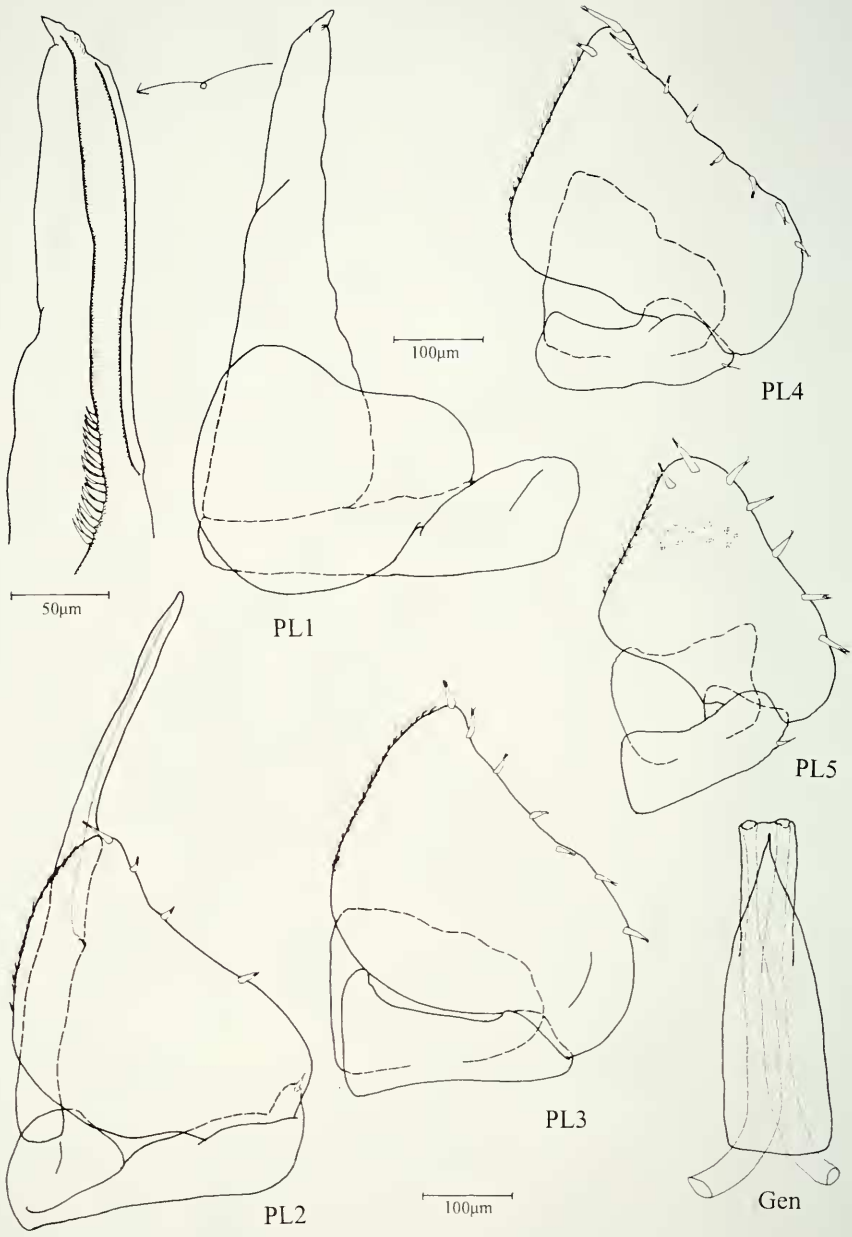

FIG. 6: *Quintanoscia contoyensis* (Mulaik, 1960), ♂ 3.5mm body length. Gen genital papilla; PL1-5 pleopods 1 to 5 in rostral view, with detail of endopodite 1 in caudal view.

TYPE SPECIES: *Philoscia ctenoscoides* Mulaik, 1960 (by monotypy).

NUMBER OF NOMINAL SPECIES: only type species included.

ETYMOLOGY: The genus name is derived from oxalá, the god of creation of the indígenas from Brazil.

REMARKS: The genus *Oxalaniscus* gen. n. belongs to the most basal species of the taxon Oniscoidea. It seems closely related to *Quintanoscia* gen. n. The putative synapomorphies are given above. The following characters are the autapomorphies of this genus:

- Slender stalk of maxillula in a more lateral position [slender stalk medially, surrounded by group of lateral teeth]

In all other taxa with a slender stalk on the maxillula, it is in a medial position on the apical region, surrounded by the medial teeth of the outer group.

Oxalaniscus ctenoscoides (Mulaik, 1960) Figs 7-10

Philoscia ctenoscoides Mulaik, 1960

Material: several specimens: Mexico, Chiapas, Ruinas de Palenque, leg. 13.VII.1949, C. and M. Goodnight, Finca Guautimoc, leg. 02.VII.1950, C. and M. Goodnight; Tabasco, Emiliano Zapata, leg. 15.VIII.1945; Quintana Roo, Puerto Morelos, leg. XI.1947, B.F. Osorio Tafall, Isla Cozumel, leg. 24.XI.1947, B.F. Osorio Tafall, IPNM 1628.

Colour: "Dorso brillante e intensamente moteado con café" (Mulaik, 1960).

Cephalothorax: Wider than high with linea supra-antennalis and lamina frontalis; small lateral lobes present; compound eyes composed of about nine ommatidia (fig. 7, Ctf).

Pereon: Tegument smooth with few tricorn-like setae; coxal plates without gland pores; sulcus marginalis present; no noduli laterales visible (fig. 7, Cx4).

Pleon: Only slightly narrower than pereon; with prominent neopleurae on pleonite 3 to 5; pleotelson with rounded apex; lateral margins straight.

Appendages:

Antennula: Slender; composed of three articles; distal one cylindrical with apical pair of aesthetascs and medial set of about four aesthetascs (fig. 7, An1).

Antenna: Peduncle with scattered tricorn-like setae; flagellum broken in all the material examined; thus nothing can be said about the shape and the apical organ. According to Mulaik (1960) it is composed of three articles.

Mouth parts as decribed in generic diagnosis (fig. 8).

Pereopods: Rather stout (fig. 9; PE1-7); carpus without latero-distal setal tuft; no ornamental sensory spine on carpus 1; antenna-grooming brush longitudinal; carpus and merus 1 to 5 with loose brush of sensory spines; dactylus with short inner claw (fig. 9, Dac); all interungual setae broken in material examined; dactylar seta with flattened spatuliform apex (fig. 9, Sd1).

Pleopods: Exopodites of pleopod 3 to 5 large; bearing one to two sensory spines laterally; no respiratory areas discernible in light microscope; endopodites subrectangular (fig. 10, PL1-5). Sexual dimorphism: Male pleopod 1 exopodite obtusely triangular; endopodite more than two times longer than exopodite; slightly

bent sidewards; apex strongly bent sidewards with subterminal protrusions; about five to ten small spines at proximal end of spermatic channel (fig. 10, PL1). Pleopod 2 exopodite triangular with single latero-distal sensory spine; distal third of endopodite lace-shaped; slightly bent (fig. 10, PL2).

Uropod: As described in generic diagnosis.

Genital papilla: Ventral shield surpassed by terminally ending orifices; apex indistinctly truncate (fig. 10, Gen).

REMARKS: The two new genera *Quintanoscia* and *Oxalanoiscus* from Mexico are quite primitive with respect to several characters: They bear a subrectangular maxilla, the maxillipedal palp is equipped with very prominent setal tufts and the penicil of the endite is still prominent. Nonetheless, they are united in an sistergroup relationship due to the following synapomorphies:

- Cephalothorax with linea frontalis reduced [linea frontalis present]
- Molar penicil composed of three branches [molar penixcil composed of about ten branches]
- Lateral endite of maxillula with 6+4 teeth, one of the inner set absent or at least vestigial [no tooth reduced in size]
- Maxillular teeth simple [teeth of inner set cleft]

In the outgroup, represented by *Ligia baudiniana* Milne Edwards, 1840, *Deto echinata* Guérin, 1836 several species of Scleropatidae and *Alloniscus* Dana, 1852, the characters differ considerably. The mandible is bearing a penicil of about ten unfused branches and the maxillular teeth of the inner set are cleft or ctenate. Therefore, the character states in both new genera are interpreted as being derived.

In spite of their close relationship, each species is placed in a monotypic genus since the structure of the dorsal tricorn-like setae and the cephalothorax are striking. Probably *Quintanoscia* and *Oxalaniscus* are as distant to each other as they are to *Alloniscus*. In recent works on terrestrial isopods, the following characters are mostly used for generic separation: cephalothorax morphology, structure and position of dorsal receptors, presence of a sulcus marginalis, structure of the maxilliped, arrangement of the teth on the lateral endite of the maxillula, setal patterns of the pereopods, shape of pleon and pleotelson, shape of the male pleopod 5 and genital papilla (Vandel, 1973a, 1973b; Taiti & Ferrara, 1980). Therefore, a generic separation of the two taxa seems plausible.

Genus ***Littorophiloscia*** Hatch, 1947

DIAGNOSIS: Cephalothorax with linea supra-antennalis; slight lamina frontalis and lateral lobes; linea frontalis lacking; compound eyes composed of about 15 ommatidia. Antennula three-articulate; slender; antenna long with three-articulate flagellum; apical organ longer than distal article.

Mandible with molar penicil consisting of about ten free branches; maxillula with lateral endite bearing 4+6 teeth; inner set with five teeth cleft; slender stalk present; maxilla with both lobes subequal in width; maxilliped with endite setose; bearing prominent penicil rostrally; palp three-articulate; with three prominent setal tufts.

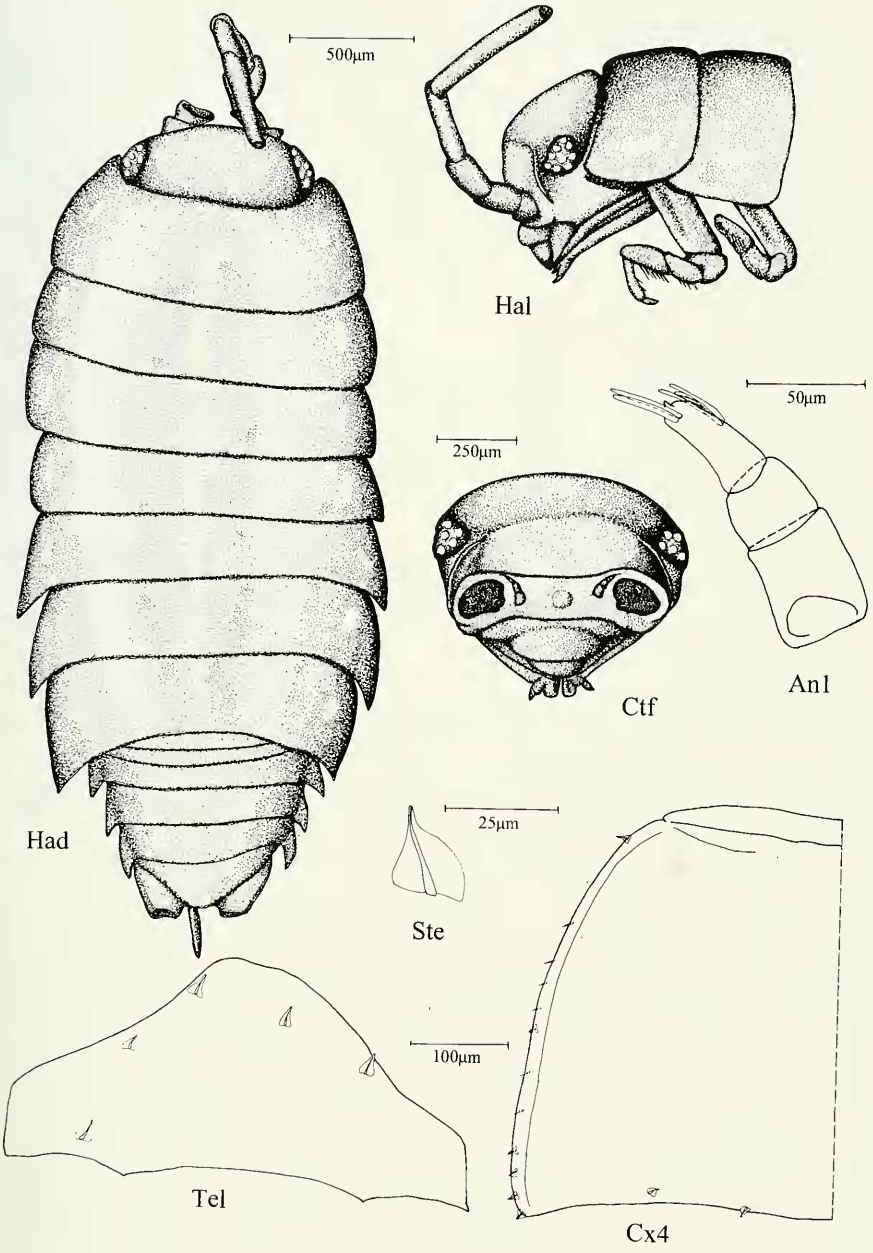

FIG. 7: *Oxalaniscus ctenoscoides* (Mulaik, 1960), ♂ 3mm body length. An1 antennula; Ctf cephalothorax in frontal view; Cx4 coxal plate IV; Had habitus in dorsal view; Hal habitus in lateral view; Ste tricorn-like seta of pleotelson; Tel pleotelson.

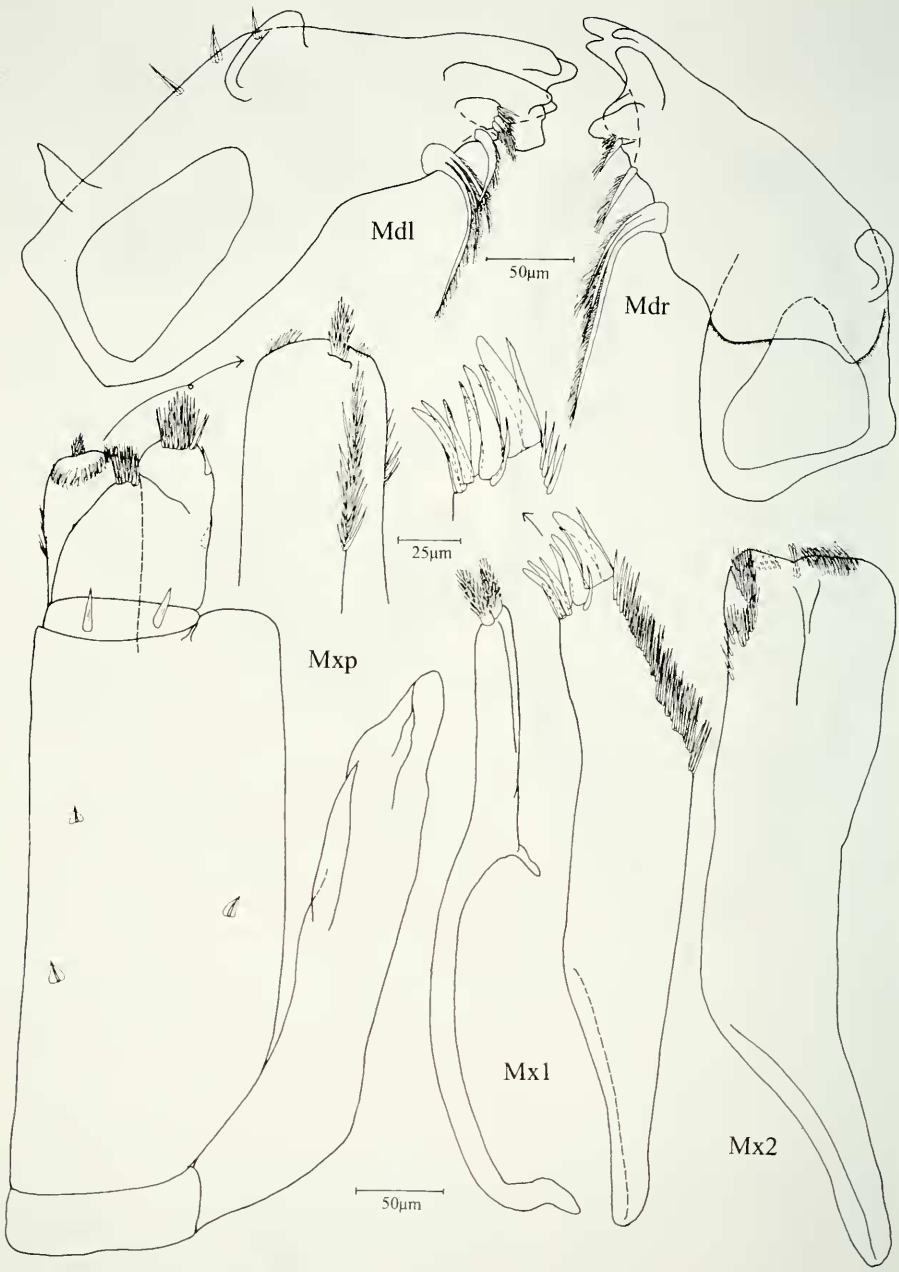

FIG. 8: *Oxalaniscus ctenoscoides* (Mulaik, 1960), ♂ 3mm body length. Mdl/r left and right mandible: Mxp maxilliped, with detail of endite in rostral view; Mx1 maxillula, with detail of apical lateral endite in rostral view: Mx2 maxilla.

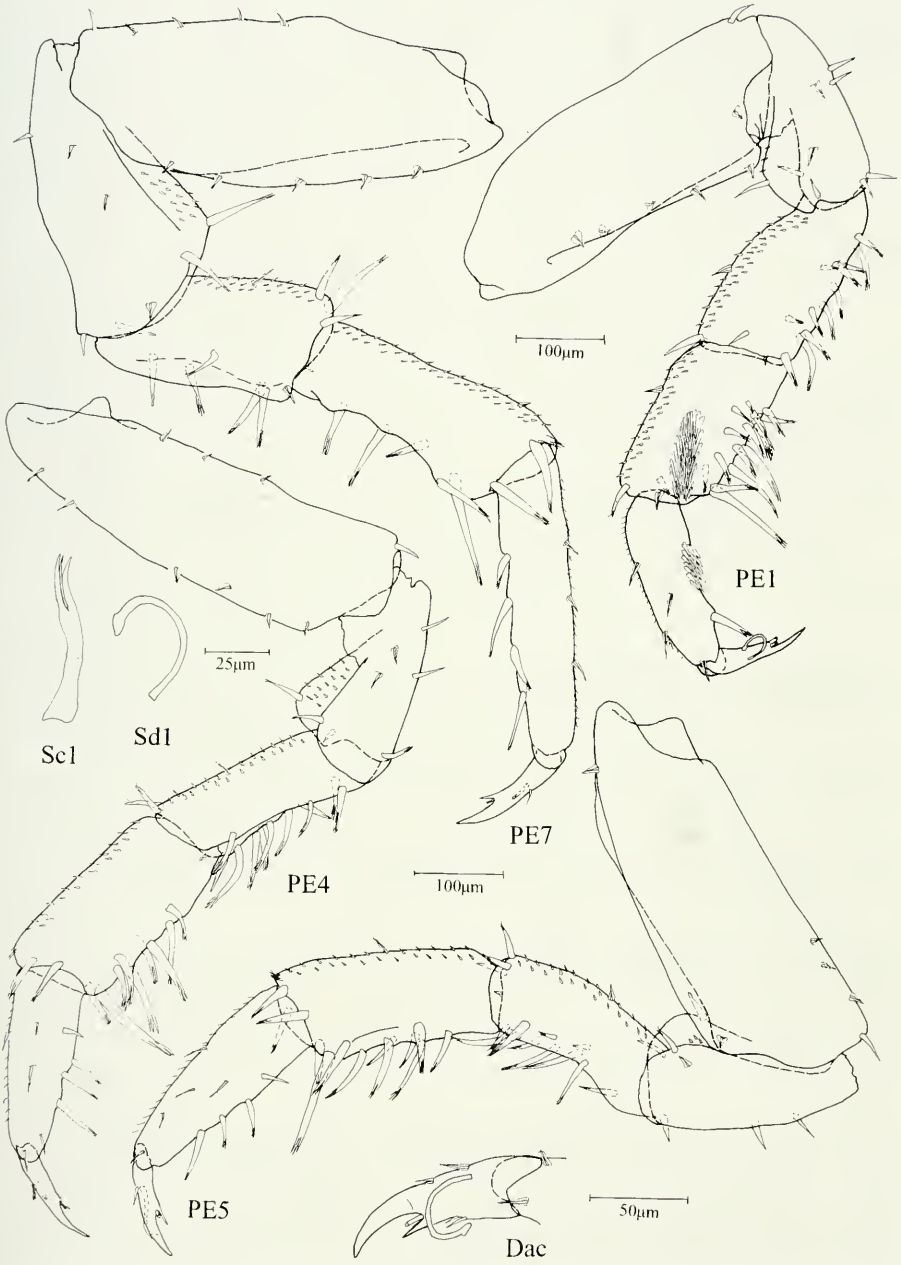

FIG. 9: *Oxalaniscus ctenoscoides* (Mulaik, 1960), ♂ 3mm body length. Dac dactylus of pereopod 1; PE1-7 pereopods 1 to 7 in rostral (PE1) or caudal view; Sc1 sensory spine of carpal brush; Sd1 dactylar seta of pereopod 1.

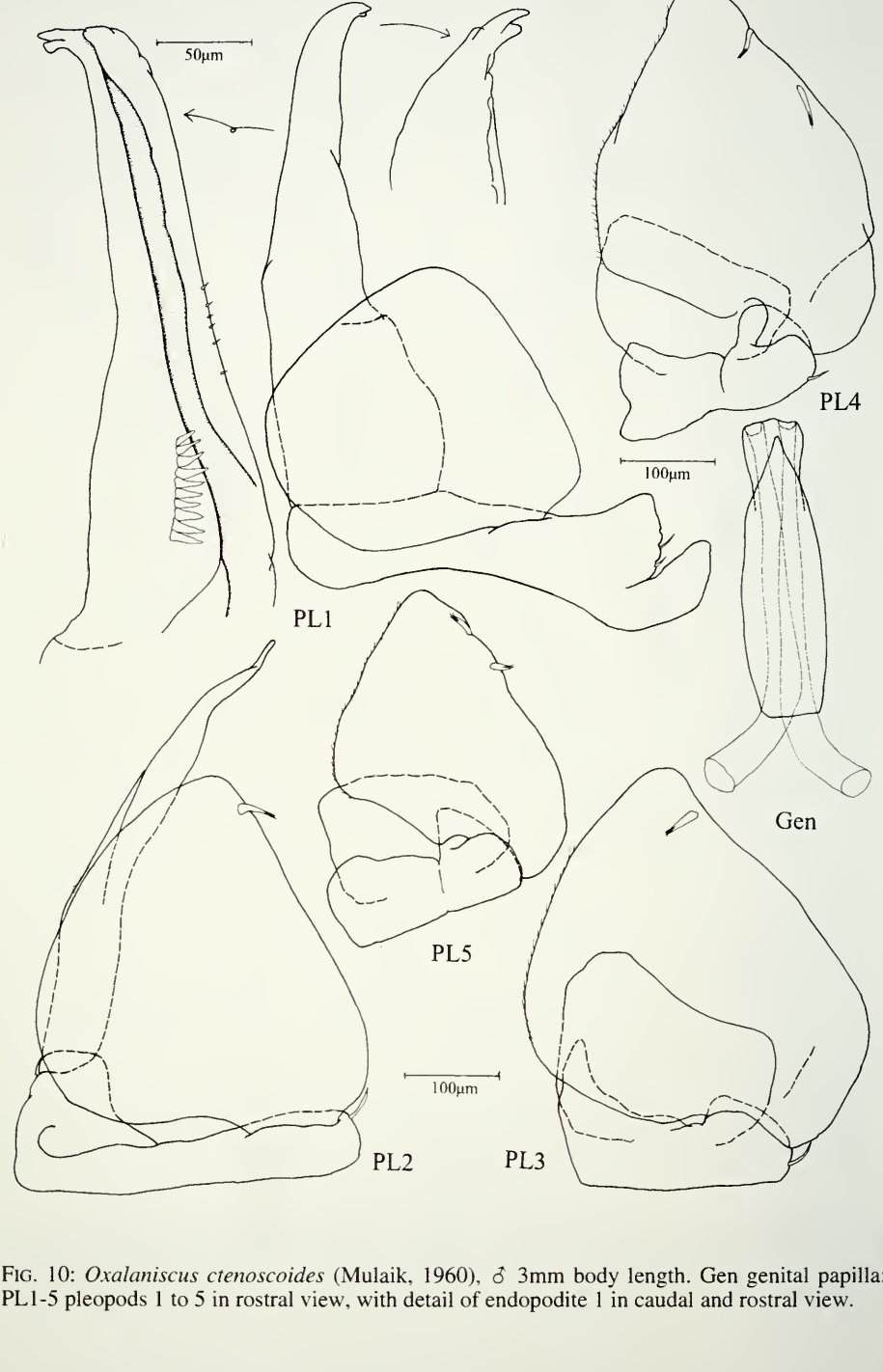

FIG. 10: *Oxalaniscus ctenoscoides* (Mulaik, 1960), ♂ 3mm body length. Gen genital papilla; PL1-5 pleopods 1 to 5 in rostral view, with detail of endopodite 1 in caudal and rostral view.

Pereopods slender; ornamental sensory spine of carpus 1 with serrate double-fringe; dactylus with interungual seta long; more conspicuous than dactylar seta; inner claw short; coxal plates without gland pores; sulcus marginalis and nodulus lateralis present; all noduli inserted at same distance from lateral margin. Male pereopod 1 propus and carpus inflated; bearing more or less prominent setal brushes.

Pleopods without respiratory areas; exopodites with about five sensory spines laterally; endopodites bilobate. Uropod with protopodite laterally grooved; endopodite inserting more proximally than exopodite.

Genital papilla with short ventral shield; orifices on small to conspicuously elongate protrusions of the terminal spatula.

TYPE SPECIES: *Philoscia richardsonae* Holmes & Gay, 1904.

NUMBER OF NOMINAL SPECIES: 23, four known from the Neotropics.

REMARKS: Taiti & Ferrara (1986a) revised the genus and gave a diagnosis for it, they stressed the similarity of the male pereopods 1 and the mouth parts in *Littorophiloscia* and *Halophiloscia* Verhoeff, 1908. With respect to the mouth parts, the polatity of the characters was misinterpreted; they are of a plesiomorphic character state in both genera, similar to the above described genera *Quintanoscia* and *Oxalaniscus*, and to other Crinocheta with a position basal to the Oniscoidea sensu Schmalfuss (1989).

Littorophiloscia denticulata (Ferrara & Taiti, 1981) Figs 11-14

Bilawrencia denticulata Ferrara & Taiti, 1981

Material examined: 3 ♂, 9 ♀ (ovigerous), 3 juveniles: Guatemala, Izabal, Lívinston, beach north of mouth of Rio Queguëche, between shells and fibres of coconuts, under *Ipomoea* sp., leg. 22.X.1998, A. Leistikow, MNHG and author's collection.

Colour: Dorsally light violaceous brown with white paramedian patches; coxal plates with two to three white patches; cephalothorax densely spotted with white; pleon uniformly violaceous brown.

Cephalothorax: Linea frontalis reduced; linea supra-antennalis; lamina frontalis and small lateral lobes present; compound eyes comprising eight ommatidia (fig. 11, Ctf).

Pereon: Slightly arched; coxal plates with sulcus marginalis and nodulus lateralis; distance between noduli and lateral margin subequal on all coxal plates (fig. 11, Cx4/Cxp); scattered tricorn-like setae present.

Pleon: Narrower than pereon; small neopleurae on pleonites 3 to 5 present; pleotelson rounded with few tricorn-like setae along margin.

Appendages:

Antennula: Long and slender; three-articulate with pairs of aesthetascs in a rowon distal article (fig. 11, An1).

Antenna: Slender sparsely covered with of tricorn-like setae; flagellum three-articulate with long apical organ; bearing short free sensilla; being as long as distal article (fig. 11, An2).

Mandible: Pars intermedia with two penicils on left and one on right side; bearing few setae; molar penicil composed of three branches; mandibular body slender (fig. 12, Mdl/r).

Maxillula: Medial endite with two weak penicils and apical tip; lateral endite with 4+6 teeth; five of inner set cleft; slender stalk present (fig. 12, Mx1).

Maxilla: Subrectangular with both lobes subequal in width; scattered trichiform setae present; more than ten cusps apically of medial lobe (fig. 12, Mx2).

Maxilliped: Basipodite slender; with sulcus lateralis; palp three-articulate; setal tufts prominent; setae of proximal article subequal in length; endite slender; apically setose; prominent penicil on rostral surface present (fig. 12, Mxp).

Pereopods: Slender; with scattered tricorn-like setae (fig. 13, PE1-7); carpus with prominent antenna-grooming brush; along medial margin covering almost one half of carpus length; ornamental sensory spine with hyaline apex; slightly striate (fig. 13, Sc1); dactylus with simple dactylar seta (fig. 13, Dac); inner claw short; interungual seta with hyaline spatuliform apex. Sexual dimorphism: Male pereopods 1 to 2 with setal brushes on carpus; propus 1 inflated; equipped with prominent setal brush.

Pleopods: Pleopod exopodites rhomboid; with one to two sensory spines laterally; endopodites subtriangular; no respiratory organs discernible in light microscope (fig. 14, PL1-5). Sexual dimorphism: Male pleopod 1 endopodite rounded; endopodite slender; more than two times longer than exopodite; apex acute; slightly bent sidewards; distal third with caudomedial row of spines; laterally with three to five subapical teeth (fig. 14, PL1). Pleopod 2 exopodite pointed; laterally sinuous; endopodite slender; one third longer than exopodite (fig. 14, PL2).

Uropod: As in other species of the genus.

Genital papilla: Ventral shield with straight margins basally; terminal spatula with orifices surpassing ventral shield; slightly bilobate (fig. 14, Gen).

Distribution: Andaman Islands, Grub Island.

Remarks: *Littorophiloscia denticulata* was described from the Andaman Islands as a close relative of *L. albiciucta* (Vandel, 1973) and *L. occidentalis* (Ferrara & Taiti, 1983). The outstanding autapomorphy of this species is the denticulated male pleopod 1 endopodite; which is unique among its congeners. On the other hand, the species mentioned above have a pleopod 1 with a similar structure. It is not possible to evaluate the phylogenetic status of this character. Due to the relative simplicity of its structure in comparison to its congeners, like *L. richardsonae* (Holmes and Gay, 1904) and *L. riedlii* (Strouhal, 1966), the latter formerly placed in *Stenophiloscia* (Strouhal, 1966), *L. denticulata* may be close to the basis of this genus.

The occurence of this species in Guatemala most probably is due to human introduction. The locality is 20 km north of Puerto Barrios, the main sea harbour of Guatemala. *L. denticulata* may have been displaced with cargo from the South East Asia, where it is assumed to be autochthonous, because its closest relatives occur in the Indopacific region (Taiti & Ferrara, 1986a) and the radiation of this group might have taken place in this area.

Burmoniscus Collinge, 1914

A diagnosis of *Burmoniscus* was given in Taiti & Ferrara (1986b).

Type species: *Burmoniscus moulmeinus* Collinge, 1914 (senior synonym of *Philoscia coeca* Budde-Lund, 1895).

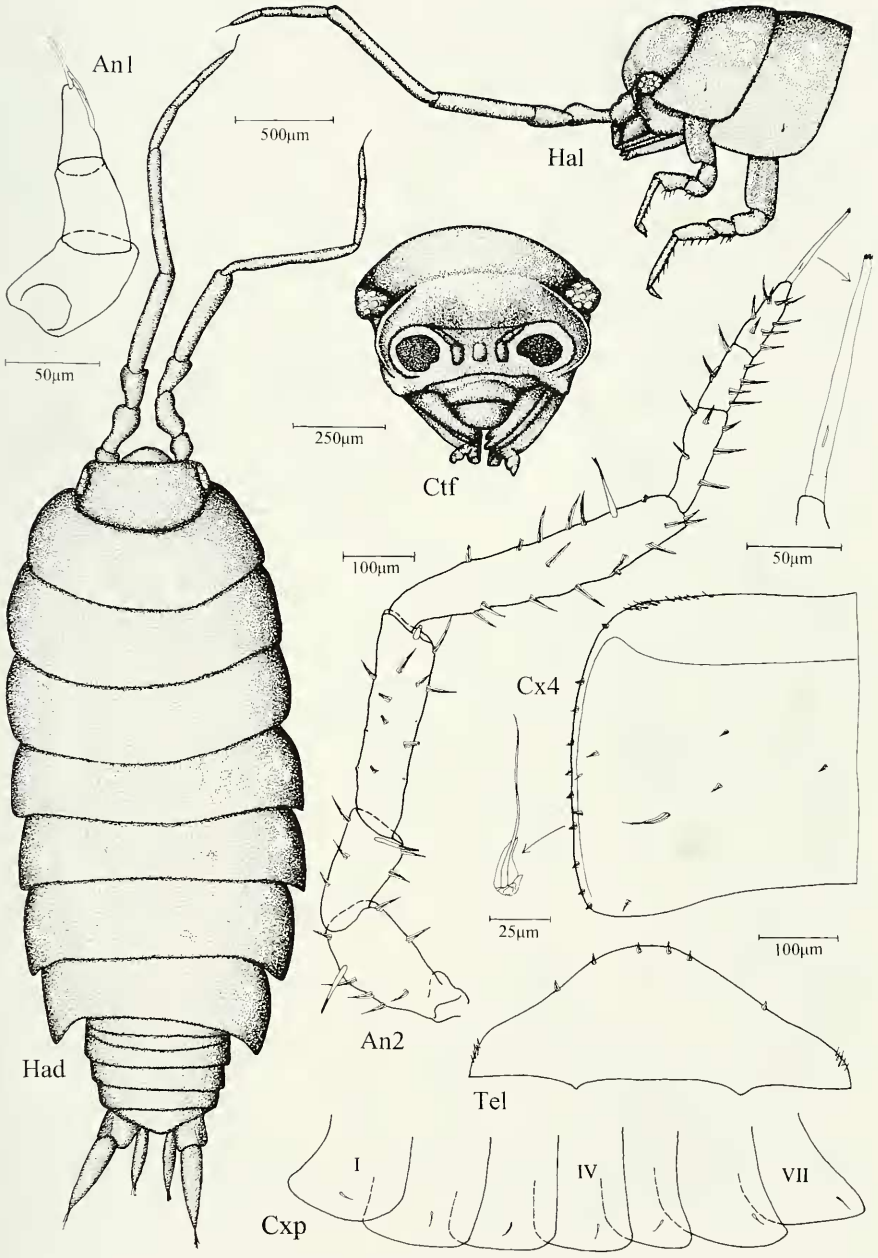

FIG. 11: *Littorophiloscia denticulata* (Ferrara & Taiti, 1981), ♂ 3.5mm body length. An1 antennula; An 2 antenna, with detail of apical organ; Ctf cephalothorax in frontal view; Cx4 coxal plate IV, with detail of nodulus lateralis; Cxp coxal plates with position of noduli laterales; Had habitus in dorsal view; Hal habitus in lateral view; Ste tricorn-like seta of pleotelson; Tel pleotelson.

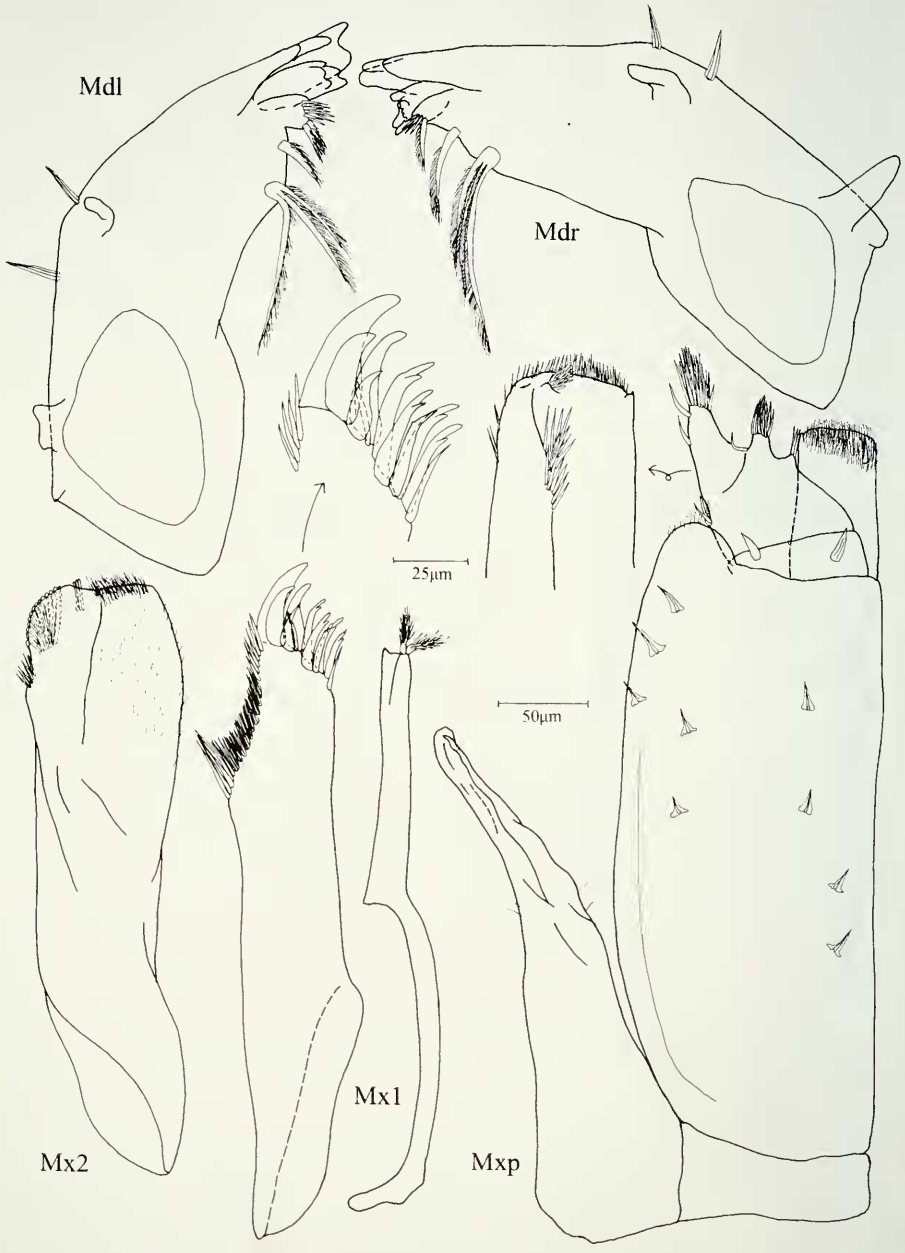

FIG. 12: *Littorophiloscia denticulata* (Ferrara & Taiti, 1981), ♂ 3.5mm body length. Mdl/r left and right mandible; Mxp maxilliped, with detail of endite in rostral view; Mx1 maxillula, with details of apical lateral endite in rostral view; Mx2 maxilla.

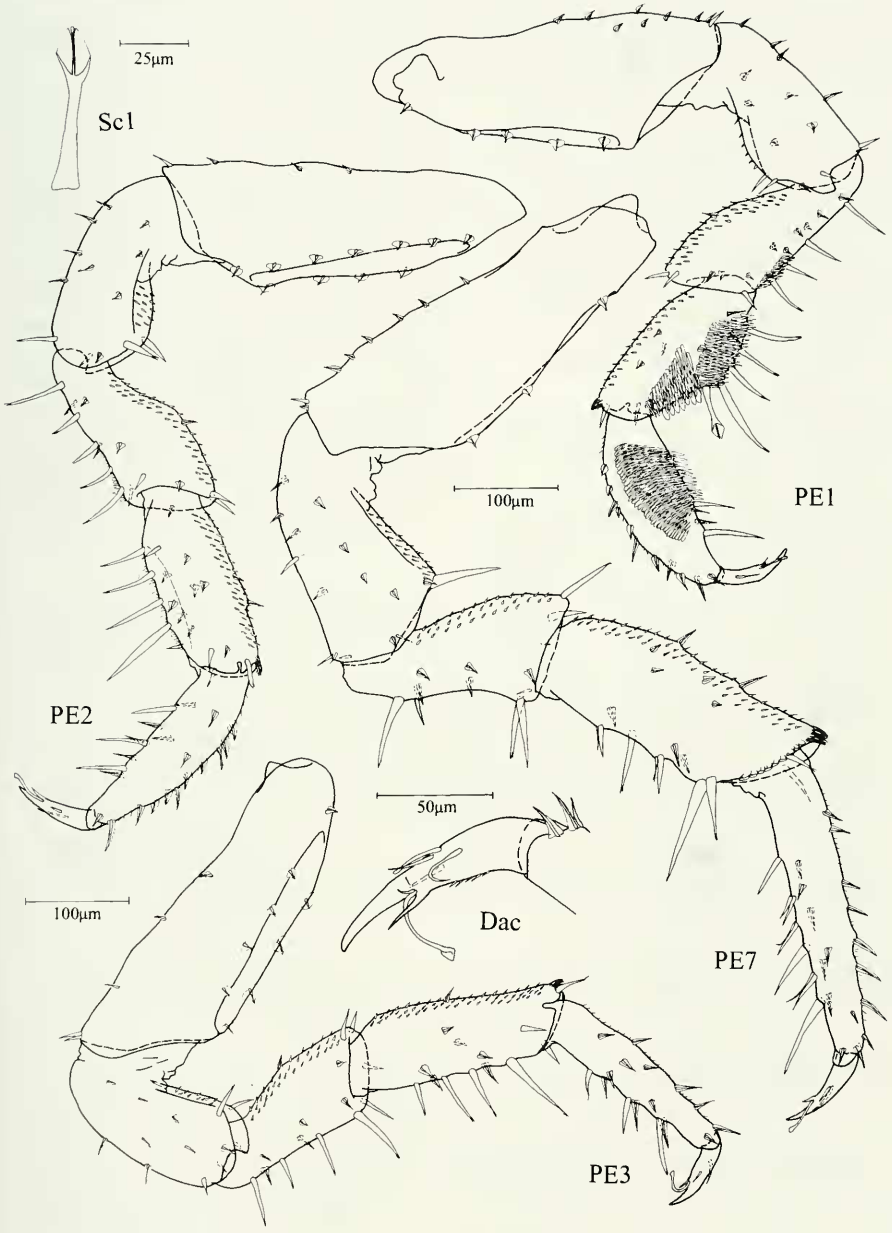

FIG. 13: *Littorophiloscia denticulata* (Ferrara & Taiti, 1981), ♂ 3.5mm body length. Dac dactylus of pereopod 1 in rostral view; PE1-7 pereopods 1 to 7 in caudal or rostral (PE1) view; Sb4 tricorn-like seta of basis 4; Sc1 ornamental sensory spine of carpus 1.

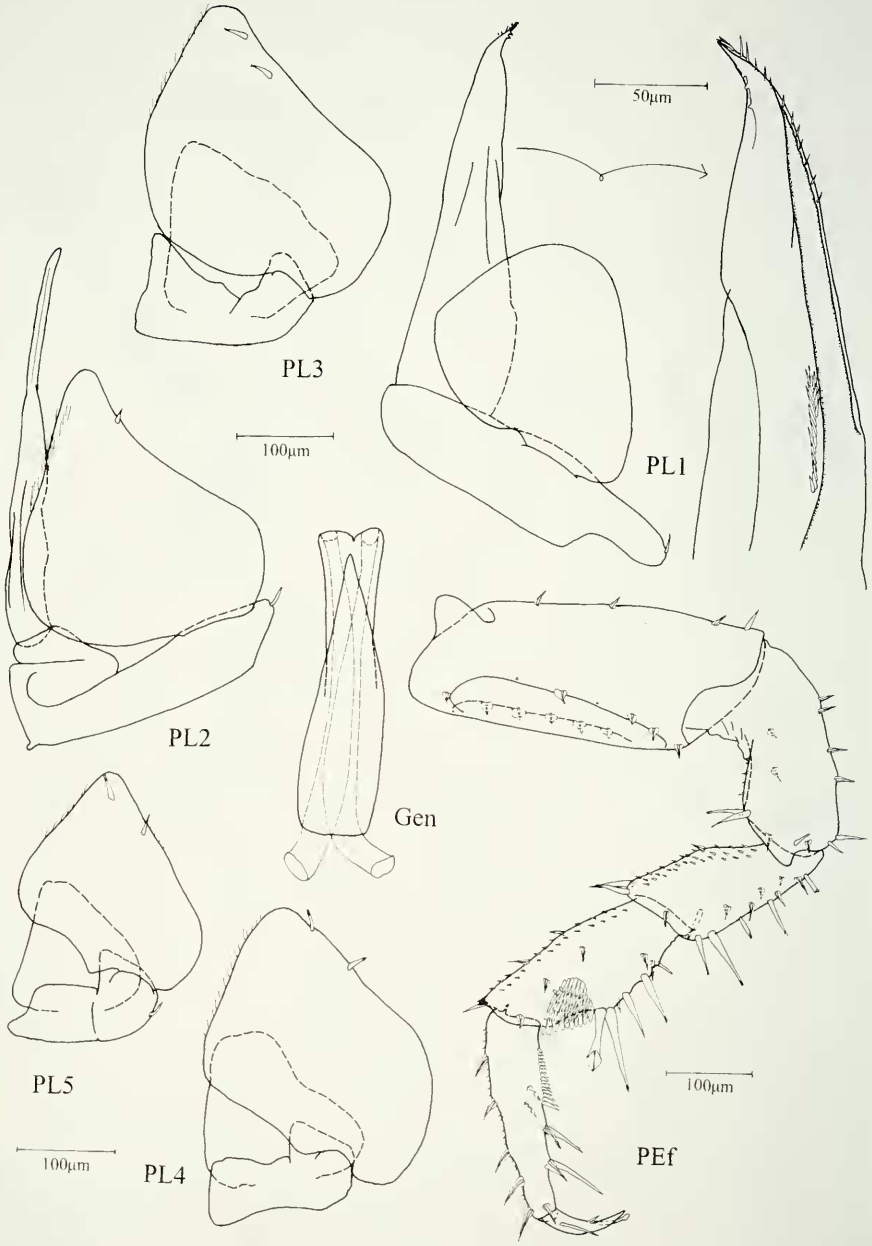

FIG. 14: *Littorophiloscia denticulata* (Ferrara & Taiti, 1981). ♂ 3.5mm body length / ♀ 4.5mm body length. Gen genital papilla; PEf female pereopod 1 in rostral view; PL1-5 pleopods 1 to 5 in rostral view, with detail of endopodite 1 in caudal view.

NUMBER OF NOMINAL SPECIES: 58, two are reported from the Neotropics, both of which most pobably introduced from West Africa and Southeast Asia.

DISTRIBUTION: Southeast Asia, East Africa, West Africa (?); some species with circumtropical distribution due to dispersal by man.

REMARKS: The genus *Burmoniscus* Collinge, 1914 has been revised and newly defined by Taiti & Ferrara (1986b). It is a heterogeneous, probably paraphyletic group, comprising blind and unpigmented species and species which are superficially similar to several members of *Ischioscia* Verhoeff, 1928; e.g., *Burmoniscus davisi* Taiti & Manicastri, 1988. In fact, no autapomorphies of the genus are described until now. The characteristic position of the nodulus lateralis on coxal plate II is shared with, e.g., *Anchiphiloscia* Stebbing; 1908 (Ferrara & Taiti, 1986), from which it differs in the presence of gland pores and a sulcus marginalis, certainly plesiomorphies of *Burmoniscus*.

The genus is distributed in the Oriental region, where it occurs with more than 30 species. The first record from South America was *B. meussii* (Holthuis, 1949), reported from Brazil by Araújo *et al.* (1996). It is found in suitable habitat in Venezuela as well (pers. obs.). Records of the little known species *Burmoniscus kohleri* (Schmalfuss & Ferrara, 1978) are presented from Guatemala for the first time.

Burmoniscus kohleri (Schmalfuss & Ferrara, 1978) Figs 15-18

Rennelloscia kohleri Schmalfuss & Ferrara, 1978

Material examined: 2 ♂ (max.body length 2.5 mm), several ♀: Guatemala, Izabal, Aldea de Los Irrayoles, in scarse leaf litter in a plantation of Blepheridium? guatemalensis (Rubiaceae), leg. A. Leistikow; 17.X.1998, MNHG and author's collection; 2 ♂ (max. body length 2.5 mm); 5 ♀: Guatemala, Izabal, Aldea de Los Irrayoles; in a meadow with Cyperus sp.; leg. 17.X.1998, A. Leistikow, author's collection; 2 ♂; 3 ♀: Guatemala, Izabal, Lívinston, finca in the western part of town on hill, under rotting stems of Cocos palms, leg. A. Leistikow; 21.X.1998; author's collection

Colour: Violaceous brown with light patches in medial line; paramedially and on coxal plates; vertex densely spotted with light patches; pleon uniformly violaceous brown.

Cephalothorax: Vertex slightly arched; compound eyes composed of about five ommatidia; no linea frontalis and lamina frontalis; linea supra-antennalis present (fig. 15, Ctf).

Pereon: Slender; tegument smooth and shiny; scattered tricorn-like setae; coxal plates with sulcus marginalis and nodulus lateralis; noduli of coxal plate II and IV more remote from margin (fig. 15, Cx3/Cxp).

Pleon: Narrower than pereon; no neopleurae visible in dorsal view; pleotelson with sinuous lateral margins; pointed; bearing few tricorn-like setae.

Appendages:

Antennula: Proximal article wide; medial and distal article forming a cone; aesthetascs at top of distal article (fig. 15, An1).

Antenna: Peduncle five-articulate; length ratio from proximal to distal joint 1: 2: 2: 3: 4; flagellum three-articulate with pairs of aesthetascs on medial and distal article; apical organ as long as distal article; with short free sensilla (fig. 15, An2).

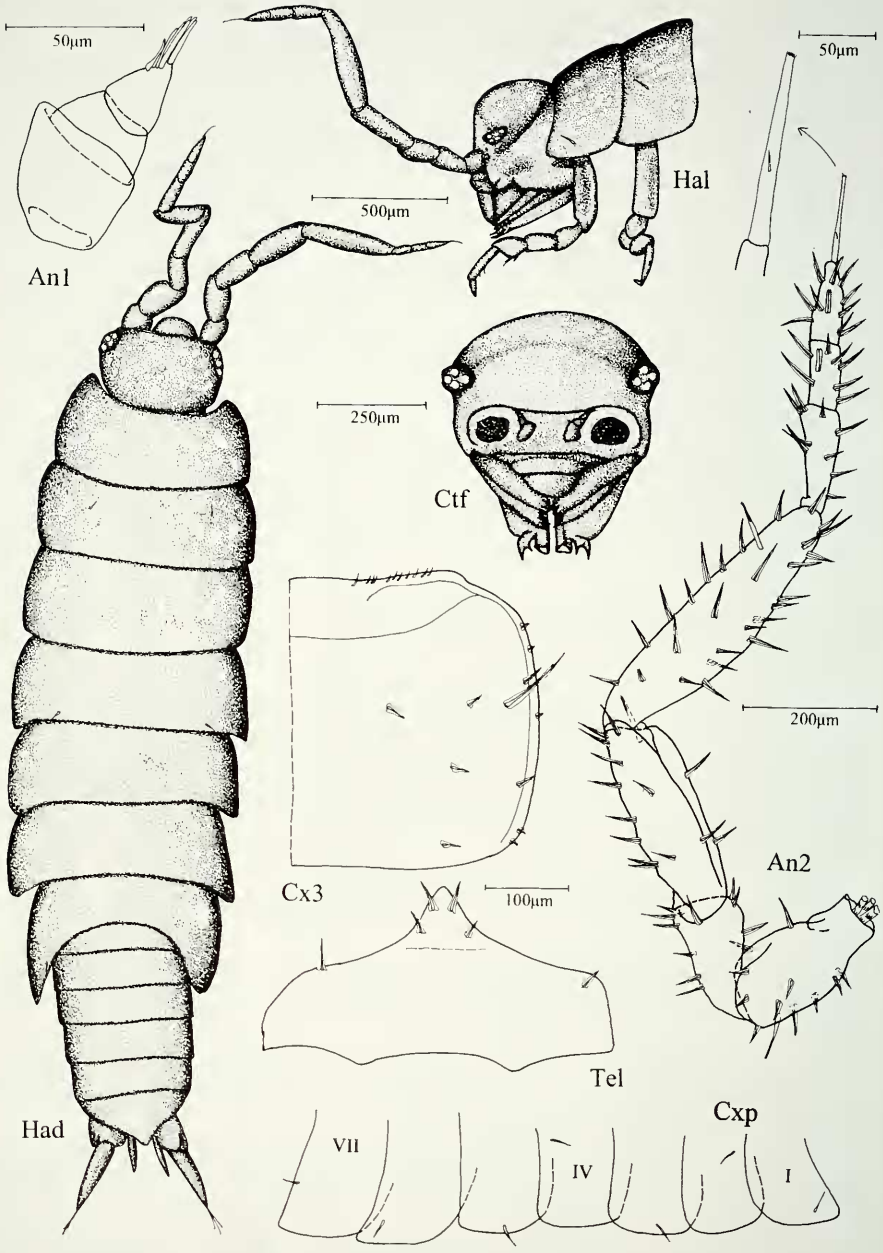

FIG. 15: *Burmoniscus kohleri* (Schmalfuss & Ferrara, 1978), ♂ 2.7mm body length. An1 antennula; An 2 antenna, with detail of apical organ; Ctf cephalothorax in frontal view; Cx3 coxal plate III; Cxp coxal plates with position of noduli laterales; Had habitus in dorsal view; Hal habitus in lateral view; Tel pleotelson.

Mandible: Molar penicil simple; pars intermedia with sparse setation; two penicils on left; one on right side; intermedial penicil present (fig. 16, Mdl/r).

Maxillula: Medial endite pointed; bearing two penicils apically; lateral endite with 4+5 teeth; three of inner set cleft; one double-cleft; one simple (fig. 16, Mx1).

Maxilla: Lateral lobe more than two times broader than medial one; setose; laterally with transverse setal rows; medial lobe with few setae and five apical cusps (fig. 16, Mx2).

Maxilliped: Basipodite with sulcus lateralis; palp with proximal article bearing two setae; inserted close together; distal articles fused; two setal tufts present; proximal one with one prominent seta; endite with strong tooth caudally and knob-like penicil rostrally (fig. 16, Mxp).

Pereopods: Slender with latero-distal setal tuft on carpus (fig. 17, PE1-7); prominent transverse setal brush on rostral surface of carpus 1; half as broad as medial margin; ornamental sensory spine double fringed (fig. 17, Sc1); dactylus with short inner claw (fig. 17, Dac); dactylar seta simple; rather short. No sexual dimorphism discernible.

Pleopods: Pleopod exopodites rhomboid; bearing one to two sensory spines laterally; single row of pectinate scales on caudal surface of exopodite 5; no respiratory areas discernible; endopodites bilobate (fig. 18, PL1-5). Sexual dimorphism: Male pleopod 1 exopodite strongly concave on lateral margin; sinuosity forming almost right angle; endopodite bent laterally; tapering in distal third; mediocaudal row of short spines present (fig. 18, PL1). Pleopod 2 exopodite pointed; laterally sinuous; endopodite slender (fig. 18, PL2).

Uropod: As in other species of the genus.

Genital papilla: Ventral shield stout; slightly surpassed by terminal spatula with orifices (fig. 18, Gen).

Distribution: West Africa, Cameroon.

Remarks: This interesting species was found to be abundant in agricultural areas of the Sierra de las Minas and the Caribbean coast at Lívinston. They live in the leaf litter or in rotten truncs of *Cocos* palms. *B. kohleri* was first discovered in Cameroon, a remarkable location for a member of this genus; since all the other species described are found in East Africa, South Asia and on the islands of the Wallacea. It is possible that this species was also introduced to Cameroon, all the localities where the species was found are close to the coast or to human settlements (Schmalfuss & Ferrara, 1978, 1983 and 1985). Thus, the natural occurence of this species may still be unknown. On the other hand, *Burmoniscus* probably is paraphyletic and *B. kohleri* might not belong to this genus. *B. kohleri* is quite distinct from its congeners due to its minute size of maximally 3 mm and the number of spines along the medial margin of carpus 1 is reduced to two as opposed to three to four spines in other species of *Burmoniscus*.

If this species is native to Cameroon, it is quite isolated from the African Oniscidean fauna by the position of the *noduli laterales* and the simple molar penicil, with one exception: Taiti & Ferrara (1980 and 1982) listed for the West African area a

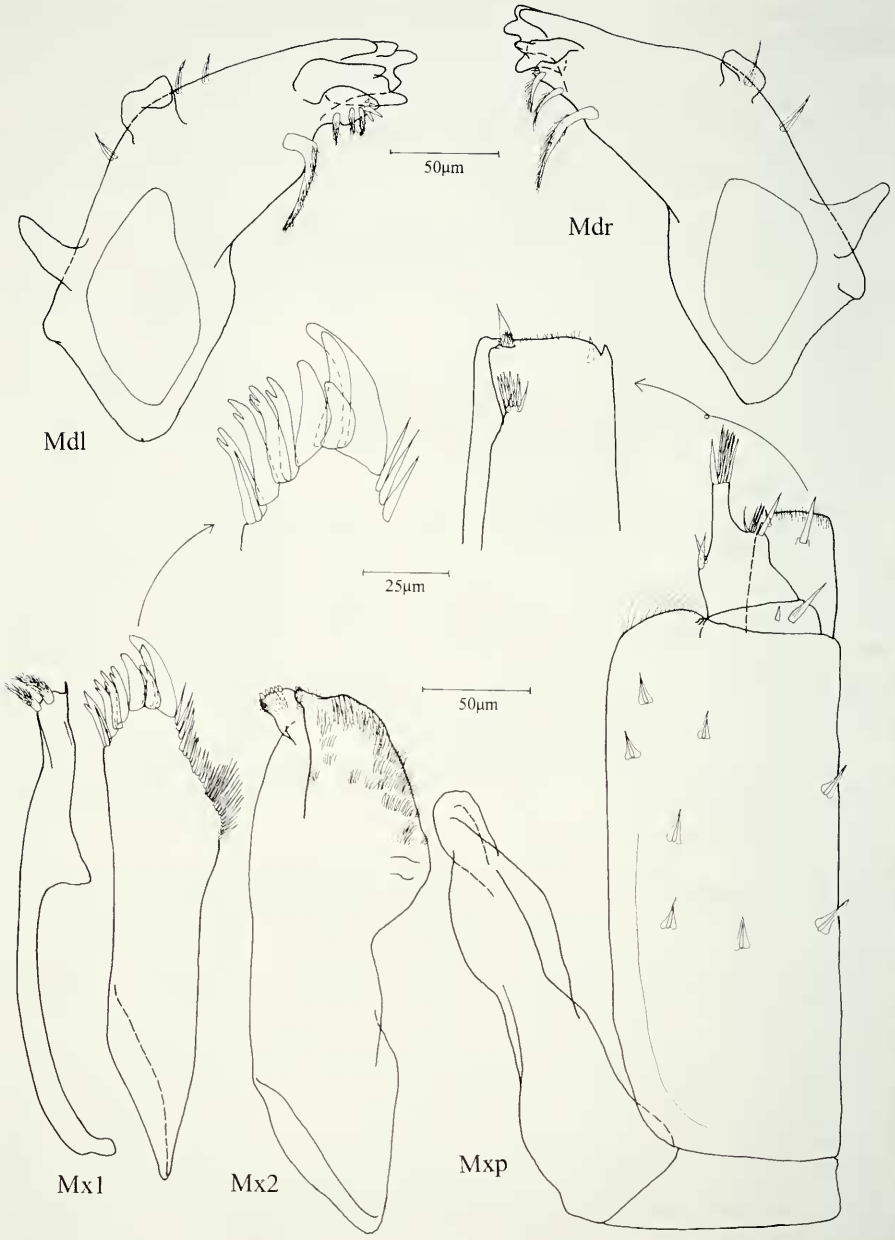

FIG. 16: *Burmoniscus kohleri* (Schmalfuss & Ferrara, 1978), ♂ 2.7mm body length. Mdl/r left and right mandible, with detail of left pars intermedia; Mxp maxilliped, with detail of endite in rostral view; Mx1 maxillula, with detail of apical lateral endite in rostral view; Mx2 maxilla.

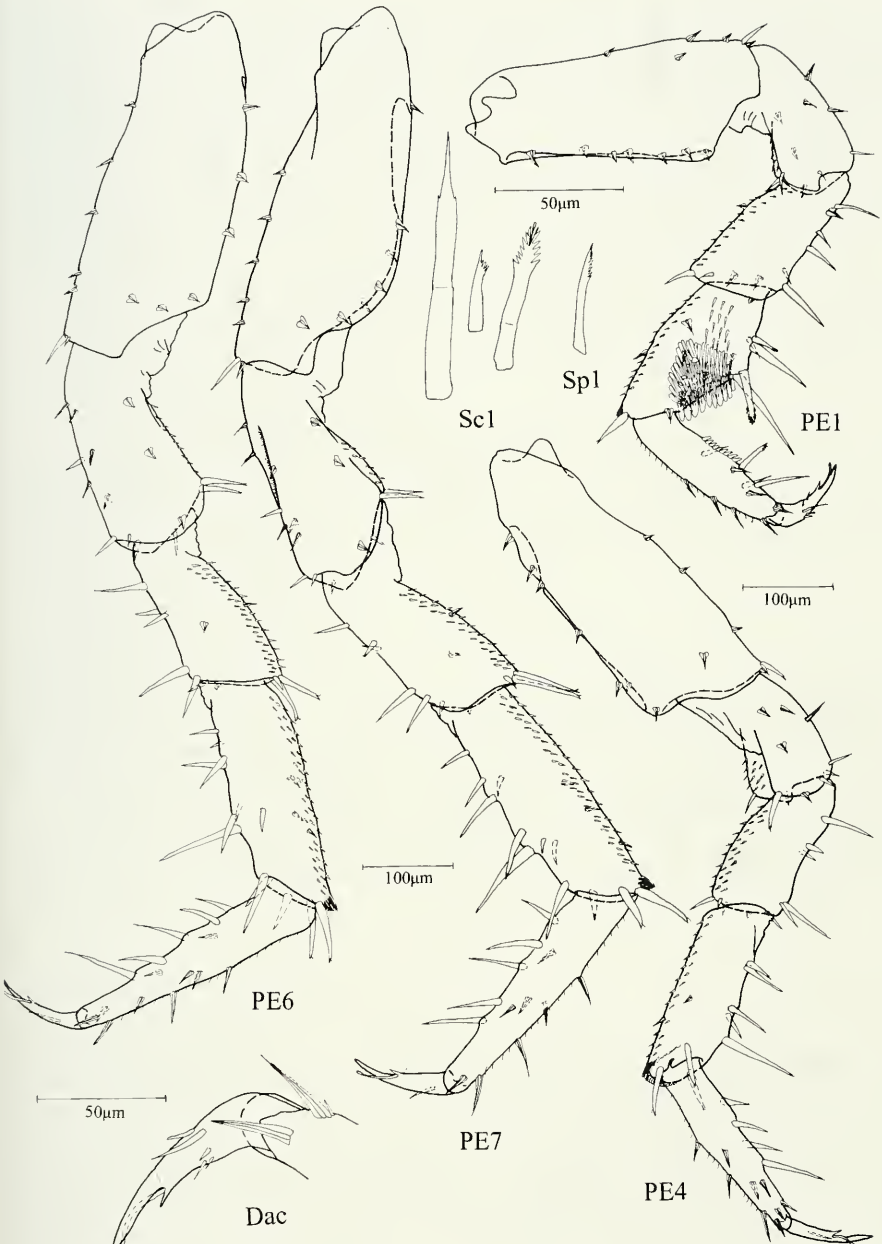

FIG. 17: *Burmoniscus kohleri* (Schmalfuss & Ferrara, 1978), ♂ 2.7mm body length. Dac dactylus of pereopod 7 in rostral view; PE1-7 pereopods 1 to 7 in caudal or rostral (PE1) view; Sc1 ornamental, longest and smallest sensory spines of carpus 1; Sp1 medioproximal sensory spine of propus 1.

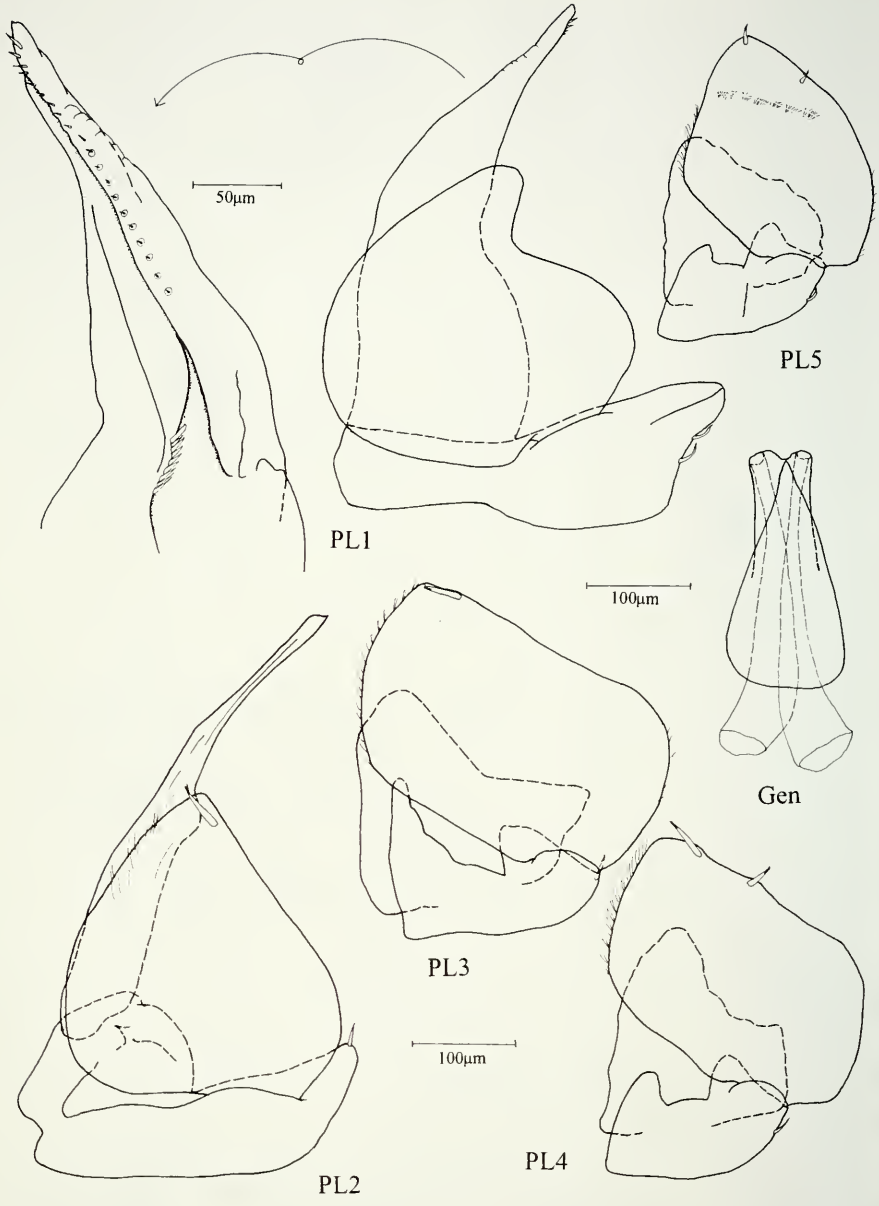

FIG. 18: *Burmoniscus kohleri* (Schmalfuss & Ferrara, 1978), ♂ 2.7mm body length. Gen genital papilla; PL1-5 pleopods 1 to 5 in rostral view, with detail of endopodite 1 in caudal view.

genus which shares these characters. *Zebrascia* Verhoeff, 1942 was described on the basis of a single female of 3 mm body length from Fernando Po (Verhoeff, 1942). This genus now comprises three species; two of them from Cameroon (Schmalfuss & Ferrara, 1978). Interestingly, the pereopod 1 carpus is of similar shape in both *Zebrascia* and *B. kohleri*, and even the number and position of the sensory spines correspond in both taxa. The position of the noduli laterales with respect to the posterior margin of the coxal plates is similar in *Zebrascia* and *B. kohleri* (Schmalfuss & Ferrara, 1978, Taiti & Ferrara, 1986b). It may be well possible that *B. kohleri* belongs to a taxon close to *Zebrascia*; with the following synapomorphies:

- Antenna-grooming brush covering half the medial margin of pereopod carpus 1 [antenna-grooming brush covering less than a third of carpus]
- Sensory spines of carpus 1 arranged in a 2-spine-pattern [sensory spines arranged in a 3-spine pattern]

In the Indopacific species of *Burmoniscus* differ from *B. kohleri* by the pereopod 1 carpus being similar to the relations found in *Androdeloscia* (three-spine-pattern, see below and fig. 20, PE1) and the antenna-grooming brush being not so broad. To clarify this puzzling taxonomic situation, all species of *Burmoniscus* and *Zebrascia* have to be re-examined.

Androdeloscia Leistikow, 1999

REMARK: The genus *Androdeloscia* was recently instituted for the small members of the genus *Prosekia* Vandel, 1968; many species are found in northern South America (Leistikow, 1999), but there are no records from Central America until now. However, two Central American species do belong to this genus, one originally described as a member of *Philoscia* (Mulaik, 1960), the other a new species from Guatemala. Beside *Ischioscia*, *Androdeloscia* is the only genus of Crinocheta of philosciid appearance known to occur in Central America and northern South America (Leistikow, 1997).

Androdeloscia formosa (Mulaik, 1960) Figs 19-22

Synonym: *Philoscia formosa* Mulaik, 1960

Material examined: 1 ♂ (body length 3 mm); 1 ♀: Guatemala, Petén, El Remate, Garden of the Casa de Don David, under coconuts and rotten leaves of *Musa* sp. and different species of deciduous trees, close to pasture at Lake Petén Itza, leg. 27.X.1998, A. Leistikow, author's collection; 3 ♂, several ♀: Guatemala, Petén, causeway between Flores and Sta. Elena, 100 m off Ciudad de Flores; in rotten *Eichhornia* sp. directly at lake shore, leg. 30.X.1998, A. Leistikow; author's collection and MNHG; 5 ♂, 4 ovigerous ♀: Guatemala, Petén, Sta. Elena, road to Grutas Actún Can; 250 m from entrance, under bark of cut trees, leg. 30.X.1998; A. Leistikow, author's collection; 3 ♂, 5 ♀ (Paratypes): Mexico, Tabasco, Palmillas, leg. 18.VIII.1945, F. Bonet, IPNM 1102-E.

Colour: Dorsally purplish brown with pale spots on pereon; medial line dark brown; white central stripe on pereonites I-IV; double line on pereonites V-VII; pleon unmarked.

Cephalothorax: Linea frontalis and lamina frontalis lacking; linea supra-antennalis present; lateral lobes small; compound eyes consisting of eight ommatidia (fig. 19, Ctf).

Pereon: Tegument smooth and shiny; coxal plates without gland pores; sulcus marginalis and noduli laterales present; the latter long and flagelliform; most dorsally inserted on coxal plate IV (fig. 19, Cx3/Cxp).

Pleon: Narrower than pereon; neopleurae of pleonites 3 to 5 small; pleotelson with straight distal margin: bearing some tricorn-like setae.

Appendages:

Antennula: Three-articulate with prominent proximal article; distal joint bulbous; bearing two distinct sets of aesthetascs separated by a shallow depression (fig. 19, An1).

Antenna: Antennal peduncle composed of five articles with length ratio 1: 2: 2: 3: 4; densely covered with tricorn-like setae; flagellum composed of three articles; distal one bearing prominent apical organ; as long as flagellar articles 1 and 2 together (fig. 19, An2).

Mouth parts similar to following species.

Pereopods: Pereopods slender; with setal tuft latero-distally on carpus; carpus 1 with antennal-grooming brush; ornamental sensory spine serrate (fig. 20, Sc1); dactylus with short inner claw and simple dactylar seta; interungual seta straight (fig. 20, Dac). Sexual dimorphism: Male pereopod 7 merus with two small lobes medio-distally; prominent lobe below distal sensory spine, directed distally; covered with small scales (fig. 20, PE1-4; plate 21, PE5-7).

Pleopods: Exopodites rhomboid with two sensory spines laterally; endopodites subrectangular (fig. 22, PL1-5). Sexual dimorphism: Male pleopod 1 exopodite rounded with slight concavity laterally; endopodite rather bulky; basal part containing muscle M49 being half as broad as protopodite; laterally sinuous; distally with prominent hump; apex slightly bent laterally; with short medio-caudal row of spines (fig. 22, PL1). Pleopod 2 exopodite triangular with one sensory spine laterally; endopodite with flagelliform distal half (fig. 22, PL2). Pleopod 5 exopodite with groove for directing pleopod 2 exopodite; apex not elongate (fig. 22, PL5).

Uropod: As in other species of the genus.

Genital papilla: Rather short and slender compared to congeners (fig. 23, Gen).

Remarks: This species belongs to a distinct subtaxon of the genus *Androdeloscia* which is characterised by a sexual dimorphism of the male pereopod 7 merus. It bears several hooks on its medial margin similar to *A. silvatica* (Lemos de Castro & Souza, 1986) and *A. pseudosilvatica* Leistikow, 1999 from the Caribbean region. Particularly *A. pseudosilvatica* resembles *A. formosa*: the male pereopod 7 merus has three hooks and the male pleopod 1 endopodite is bulbous at its base and falciform in the distal part. Both species are separated by several characters. In *A. formosa* the maxillula has a simple tooth more laterally, in *A. pseudosilvatica* the simple tooth is placed medially, the male pereopod 7 merus bears two sensory spines in vicinity of the proximal hook, in *A. pseudosilvatica* there is only one sensory spine, and the male

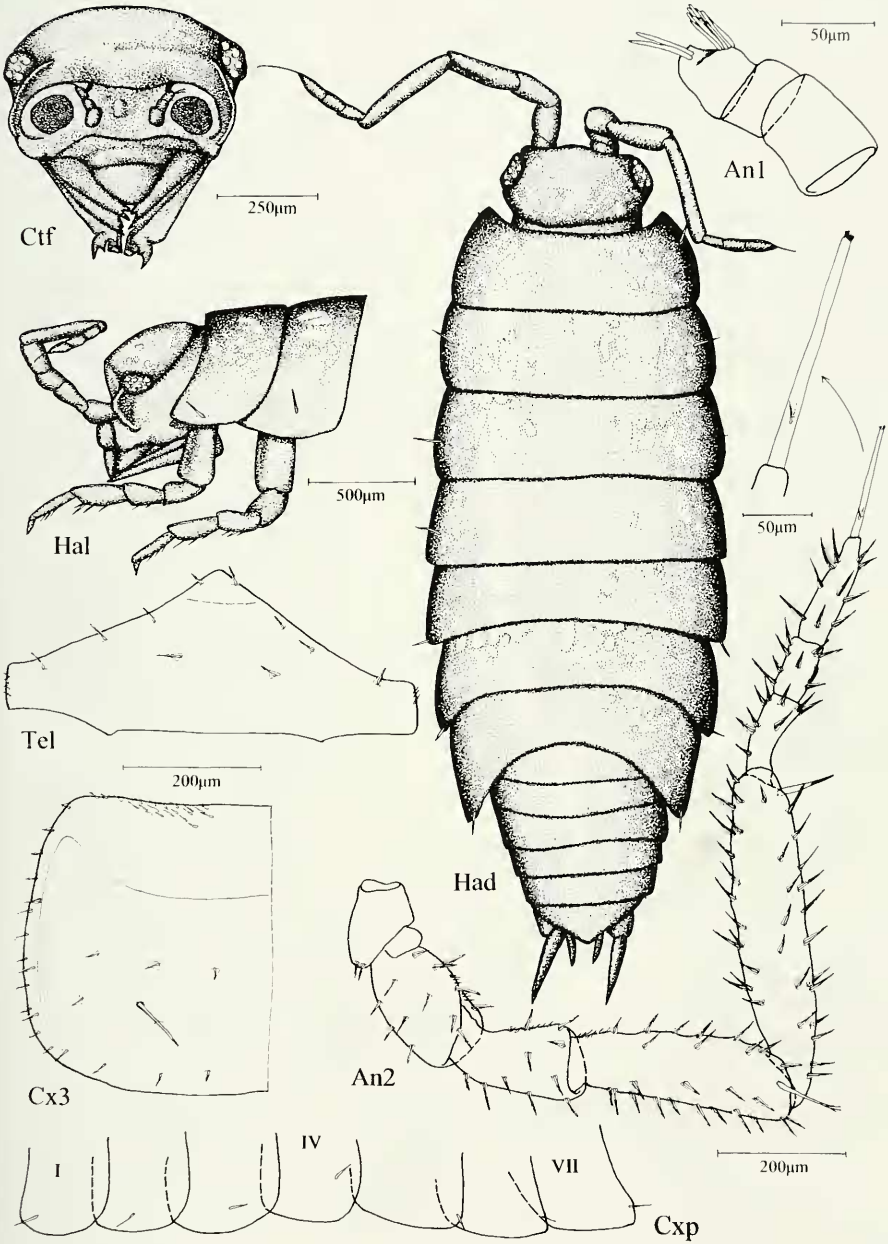

FIG. 19: *Androdeloscia formosa* (Mulaik, 1960), ♂ 4mm body length. An1 antennula; An2 antenna, with detail of apical organ; Ctf cephalothorax in frontal view; Cxp position of noduli laterales on coxal plates; Cx3 coxal plates3; Had habitus in dorsal view; Hal habitus in lateral view; Tel pleotelson.

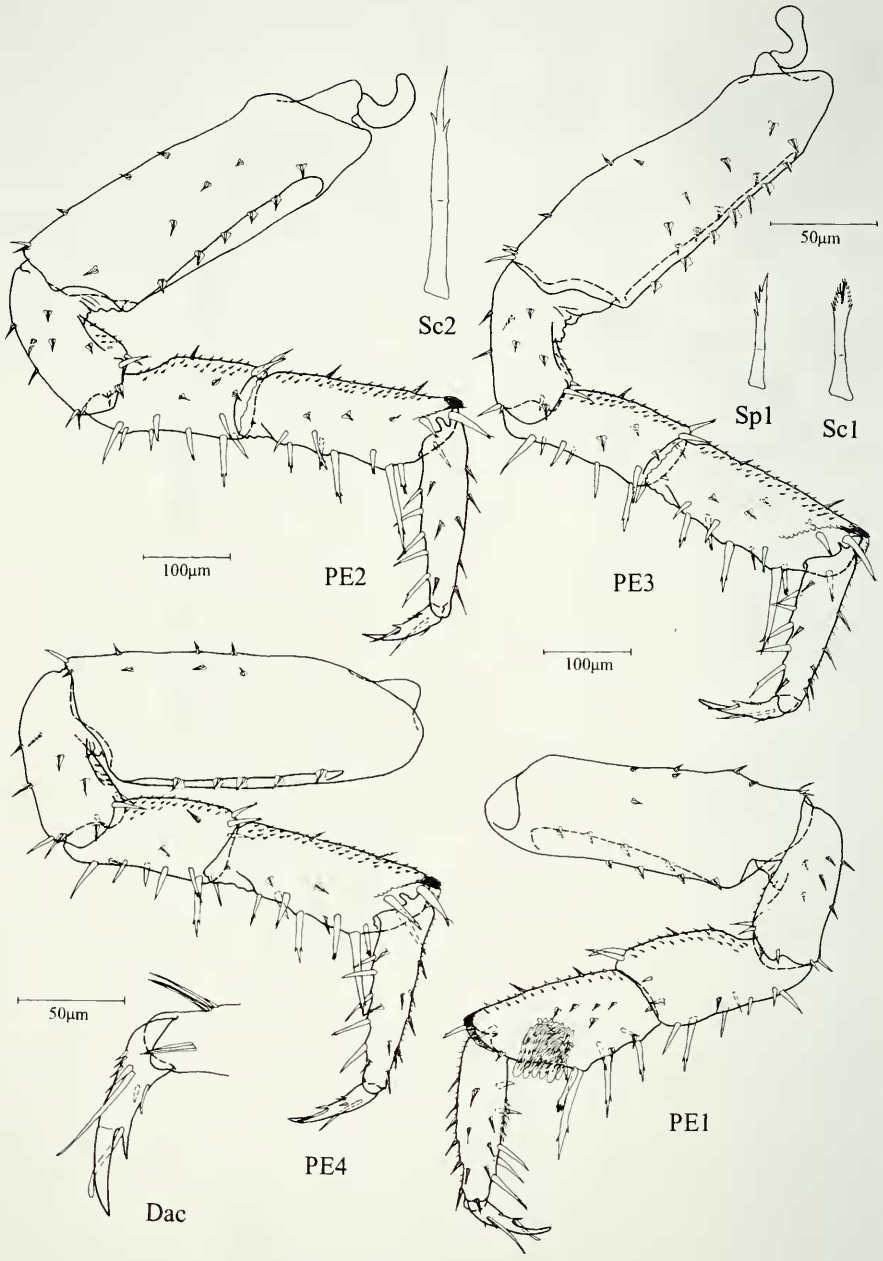

FIG. 20: *Androdeloscia formosa* (Mulaik, 1960), ♂ 4mm body length. Dac dactylus 1 in rostral view; PE1-4 pereopods 1-4 (caudal view), with detail of carpus 1 in rostral view; Sc1 ornamental sensory spine of carpus 1; Sc2 longest sensory spine of carpus 2; Sp1 distal sensory spine of propus 1.

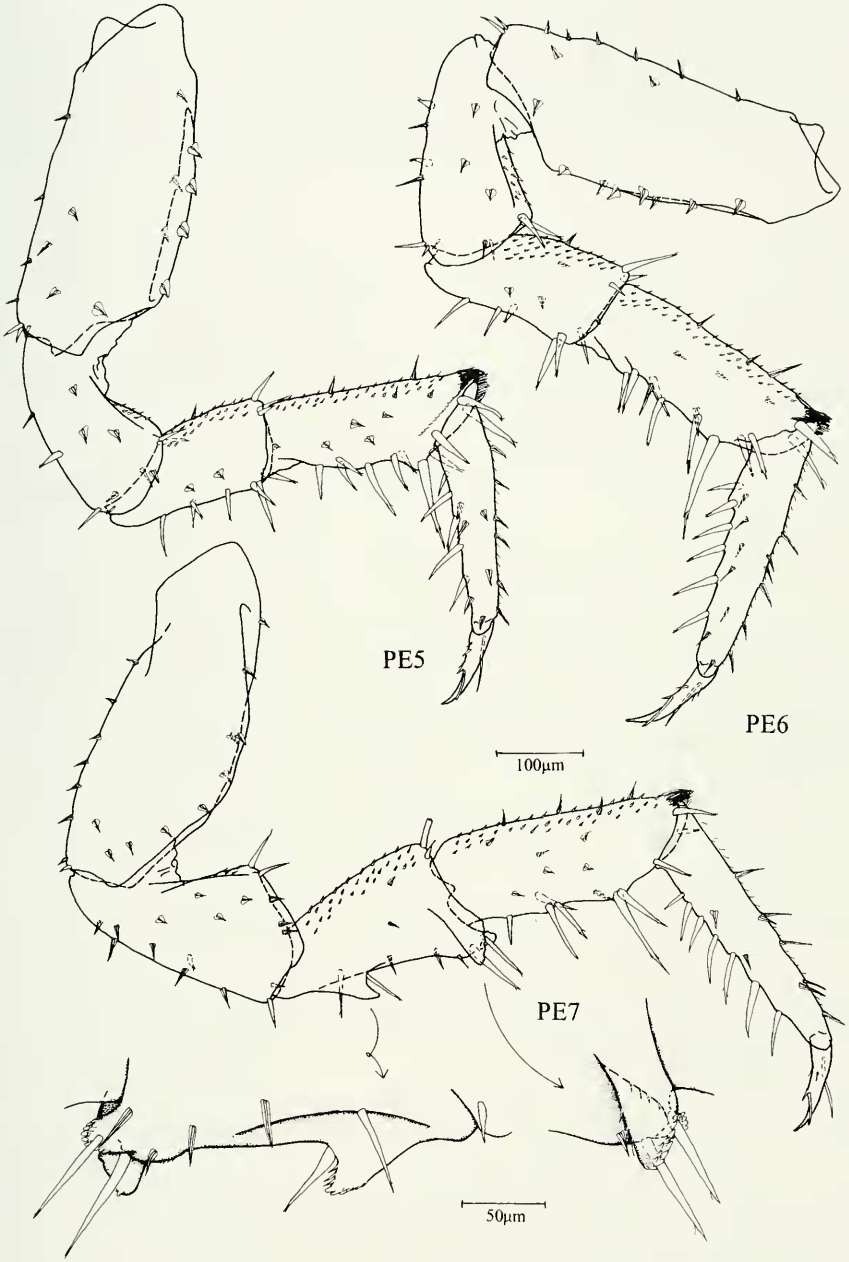

FIG. 21: *Androdeloscia formosa* (Mulaik, 1960), ♂ 4mm body length. PE5-7 pereopods 5-7 in caudal view.

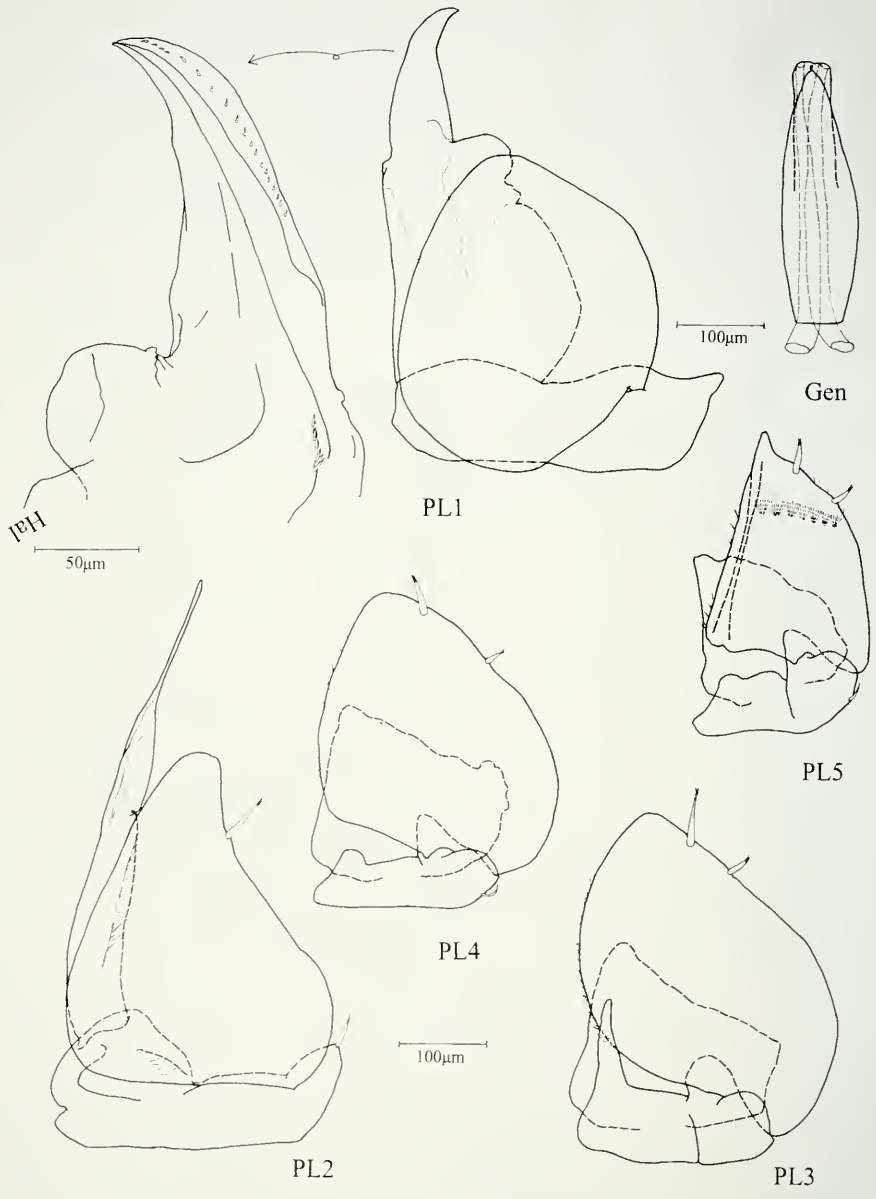

FIG. 22: *Androdeloscia formosa* (Mulaik, 1960), ♂ 4mm body length. Gen genital papilla; PL1-5 pleopods 1-5, rostral view, with detail of endopodite 1 in caudal view.

pleopod 1 endopodite has the apex smooth and a lateral hump on half-length in *A. formosa*, wheras in *A. pseudosilvatica*, the apex bears some lateral hooks and there is no lateral hump. Additionally, the dactylar seta is acute in *A. pseudosilvatica* whereas the apex of the dactylar seta in *A. formosa* is pointed. *A. pseudosilvatica* might be the the adelphotaxon of *A. formosa* and *A. silvatica*, the latter share the lateral hump of the male pleopod 1 endopodite as a synapomorphy.

Androdeloscia valdezi sp. n. Figs 23-26

Material examined: ♂ (holotype, body length 3 mm): Guatemala, Petén, causeway between Flores and Sta. Elena, 100 m off Ciudad de Flores, in rotten *Eichhornia* sp. at lake shore, leg. 30.X.1998, A. Leistikow, MNHG uncatalogised; Paratypes: 3 ♂; several ♀: same data as for holotype, Guatemala, Petén, Sta. Elena, hill facing entrance to Grutas Actún Can, scrubs, loamy soil sparsely covered with leaf litter, leg. 30.X.1998, A. Leistikow, author's collection and UVG; 3 ♂, several ♀: Guatemala; Zacapa, Rio Hondo, north of bridge over Rio Hondo, right bank, in leaf litter, leg. 18.X.1998; A. Leistikow, SMNS.

Diagnosis: Similar to most of its congeners, which do not show sexual dimorphism in the pereopods; differs in the shape of male pleopod 1 endopodite, which is pointed with lateral margin bearing several teeth.

Colour: Mostly as in other species of the genus; dorsally reddish brown with light markings of muscle insertions; cephalothorax heavily spotted.

Cephalothorax: Linea frontalis missing; lamina frontalis weak; linea supra-antennalis prominent; only slightly bent between antennal sockets; lateral lobes small; compound eyes consisting of about eight ommatidia (fig. 23, Ctf).

Pereon: Tegument shiny; dorsum bearing scattered tricorn-like setae; coxal plates with sulcus marginalis and flagelliform noduli laterales; the latter more dorsally inserted on coxal plate IV (fig. 23, Cx3/Cxp).

Pleon: Retracted from pereon; neopleurae attached; pleotelson with straight lateral margin; pointed; bearing short tricorn-like setae.

Appendages:

Antennula: Distal article apically with small tip and two aesthetascs; medially with tuft of about nine aesthetascs; medial article distinctly shorter than proximal one (fig. 23, An1).

Antenna: More slender than in preceding species; especially flagellum; distal article longest; proximal articles subequal in length; apical organ slender, longer than distal article (fig. 23, An2).

Mandible: Molar penicil consisting of a three branches; pars intermedia bearing two penicils on left and one on right mandible; intermedial penicil slender (fig. 24, Mdl/r).

Maxillula: Medial endite similar to preceding species; lateral endite with 4+6 teeth; five of inner set cleft (fig. 24, Mx1).

Maxilla: Lateral lobe only slightly broader than medial lobe; bearing pectinate scales; medial lobe sparsely covered with trichia; apically cuspidate (fig. 24, Mx2).

Maxilliped: As in other species of *Androdeloscia*; basipodite in examined specimen broken (fig. 24, Mxp).

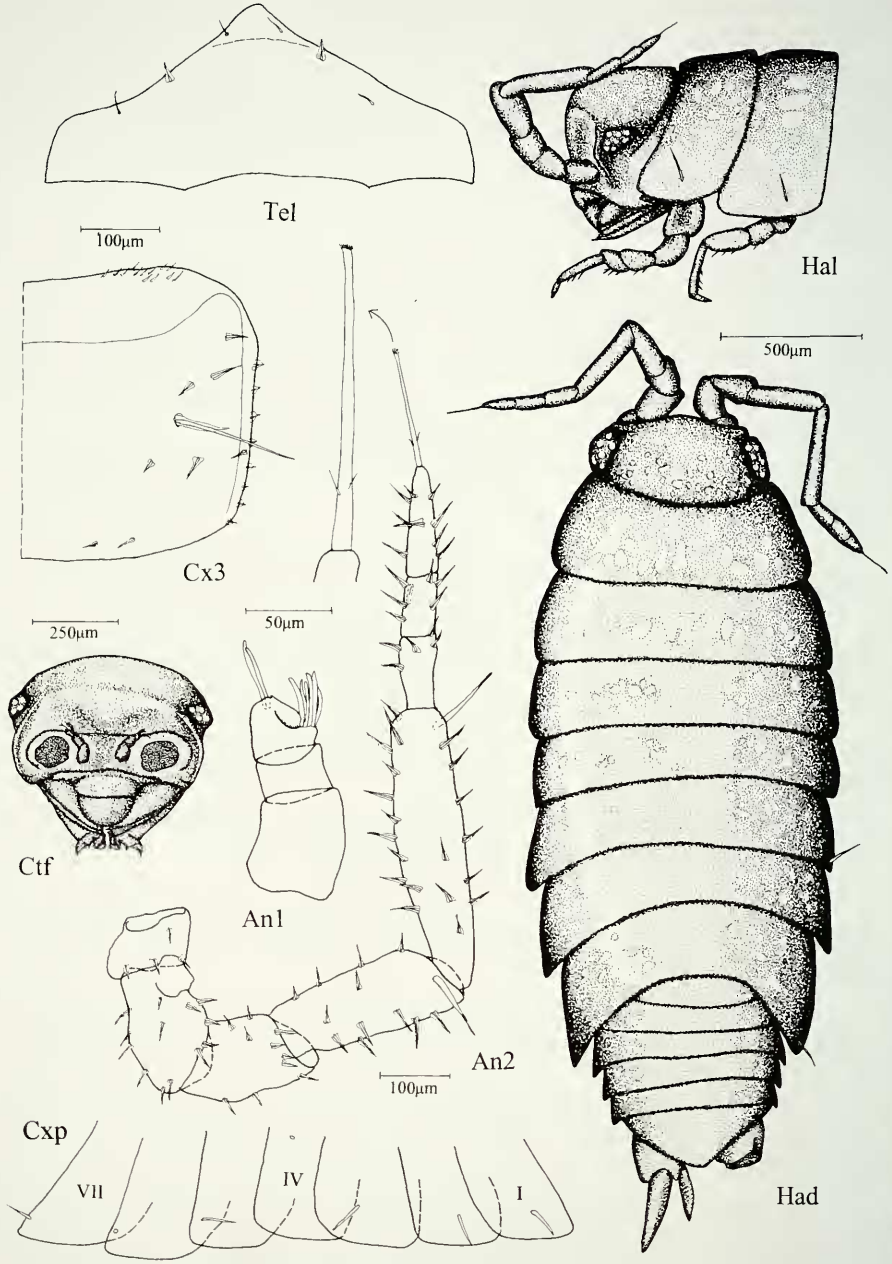

FIG. 23: *Androdeloscia valdezi* sp. n., holotype ♂ 3.5mm body length. An1 antennula; An2 antenna, with detail of apical organ; Ctf cephalothorax in frontal view; Cxp position of noduli laterales on coxal plates; Cx3 coxal plate III; Had habitus in dorsal view; Hal habitus in lateral view; Tel pleotelson.

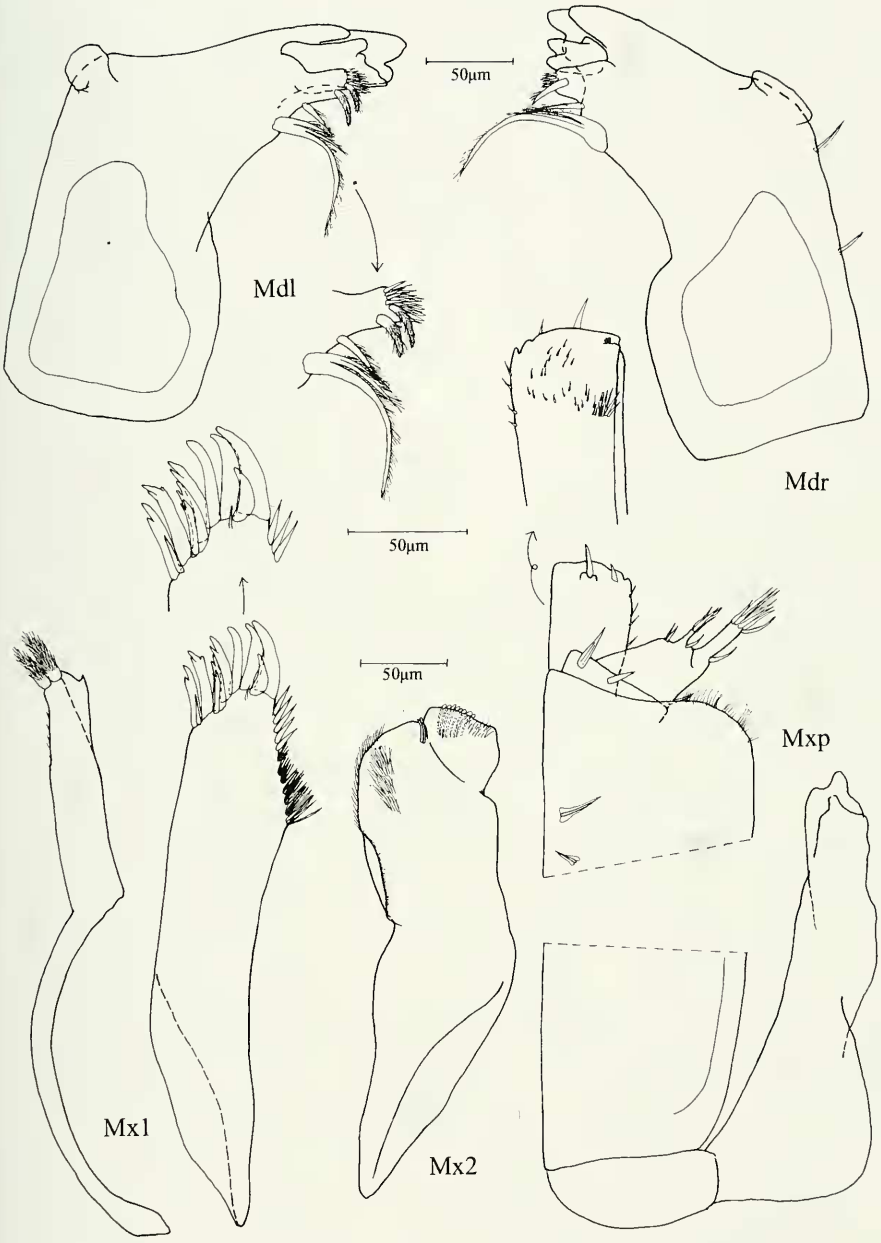

FIG. 24: *Androdeloscia valdezi* sp.n., holotype ♂ 3.5mm body length. Mdl/r left and right mandible, with detail of pars intermedia; Mxp maxilliped, with detail of endite in rostral view; Mx1 maxillula, with detail of apex of lateral endite; Mx2 maxilla.

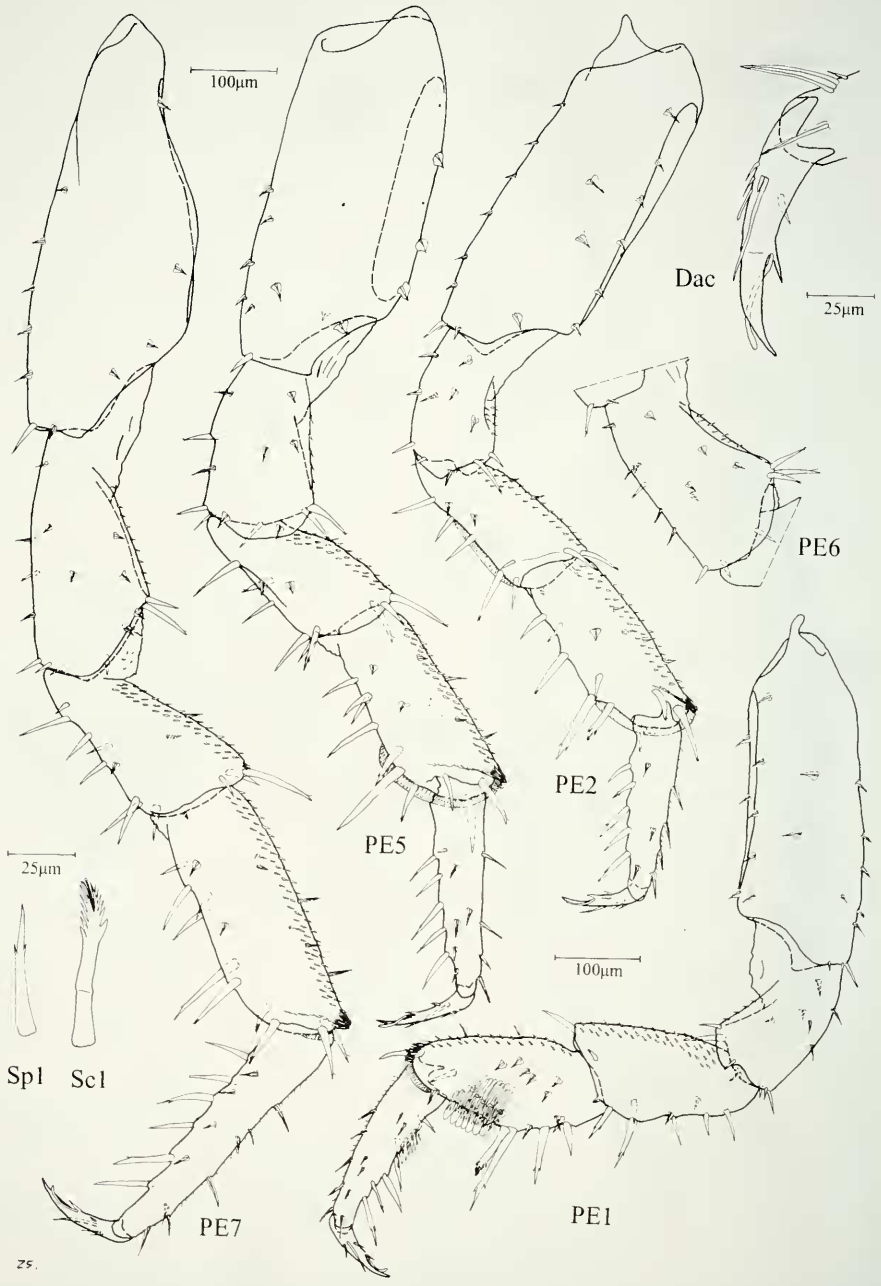

FIG. 25: *Androdeloscia valdezi* sp. n., holotype ♂ 3.5mm. Dac dactylus 1 in rostral view; PE1-7 pereopods 1 to 7 (caudal view), with details of carpus 1 in rostral and ischium 6 in caudal view; Sc1 ornamental sensory spine of carpus 1; Sp1 distal sensory spine of propus 1.

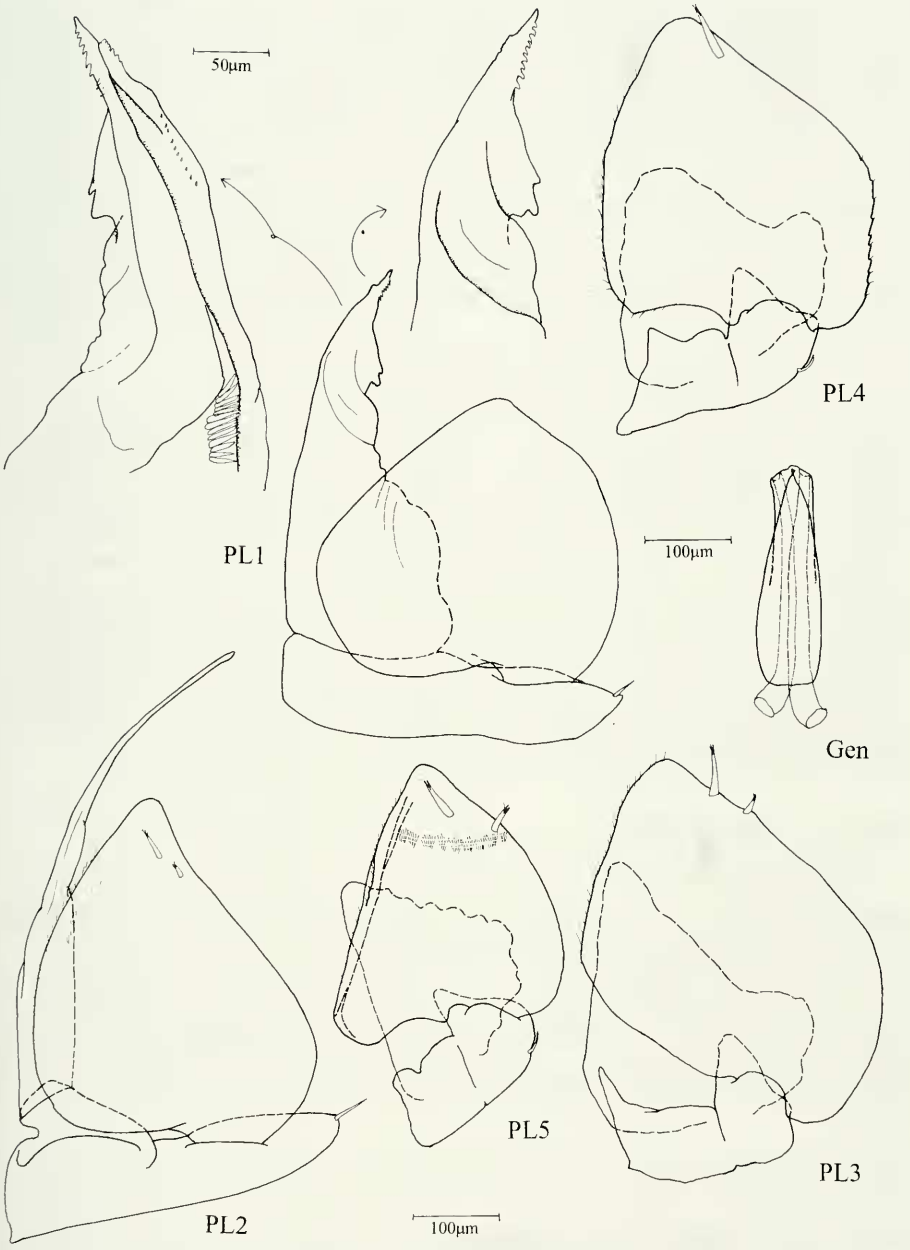

FIG. 26: *Androdeloscia valdezi* sp. n., holotype ♂ 3.5mm body length. Gen genital papilla; PL1-5 pleopods 1-5, rostral view, with details of endopodite 1 in caudal and rostral view.

Pereopods: Rather slender; especially pereopod 1; carpus with antenna-grooming brush and serrate ornamental sensory spine (fig. 25, Sc1); pereopod 2 merus with hyaline fringe medially; dactylus with long inner claw and simple dactylar seta (fig. 25, Dac). Sexual dimorphism not evident (fig. 25, PE1-7).

Pleopods: Pleopod exopodites 3 and 4 elongate rhomboid with two sensory spines laterally; exopodite 5 more or less triangular; endopodites bilobate; no respiratory areas discernible in light microscope (fig. 26, PL1-5). Sexual dimorphism: Male pleopod 1 exopodite rounded; endopodite pointed with lateral margin bearing several teeth; basal part with muscle M49 less than half the length of endopodite; short caudal row of sensory spines (fig. 26, PL1). Pleopod 2 and 5 similar to preceding species (fig. 27, PL2/5).

Uropod: As in other species of the genus.

Genital papilla: Similar to preceding species (fig. 26, Gen).

REMARKS: The new species is close to the "species-group D" of the genus *Androdeloscia* with the autapomorphies: hyaline lobes on the male pleopod 1 endopodite reduced; maxillipedal basipodite slender, apically subrectangular (Leistikow, 1999). The exact systematic position within this group is difficult to access: the male pleopod 1 endopodite in *A. valdezi* is similar to that of *A. conipus* Leistikow, 1999 and related species, but this similarity is possibly a symplesiomorphy. *A. poeppigi* Leistikow, 1999 and *A. malleus* Leistikow, 1999 form the sister group of *A. conipus* and related species. The former have the more derived endopodites 1 within species-group D. The caudo-medial row of spines is reduced and there are two subapical lobes, synapomorphic characters of *A. poeppigi* and *A. malleus*. For the time being, the systematic positon of the new species remains open to debate.

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